PMI | Africa IRS (AIRS) Project

Indoor Residual Spraying (IRS 2) Task Order Four

MADAGASCAR
END-OF-SPRAY REPORT
2013-2014

Recommended Citation: PMI|Africa IRS (AIRS) Project Indoor Residual Spraying (IRS 2) Task Order Four. May 2014. *Madagascar End-of-Spray Report 2013-2014*. Bethesda, MD. PMI|Africa IRS (AIRS) Project Indoor Residual Spraying (IRS 2) Task Order Four, Abt Associates Inc.

Contract No.: GHN-I-00-09-00013-00 Task Order: AID-OAA-TO-11-00039

Submitted to: United States Agency for International Development/PMI

Abt Associates Inc. | 4550 Montgomery Avenue | Suite 800 North | Bethesda, Maryland 20814 | T. 301.347.5000 | F. 301.913.9061 | www.abtassociates.com

2013-2014 MADAGASCAR END-OF-SPRAY REPORT

CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

AIRS	Africa Indoor Residual Spraying
BMP	Best Management Practices
CDC	Centers for Disease Control and Prevention
CHL	Central Highlands
COP	Chief of Party
CSB	Centre de Santé de Base
DEC	Data Entry Clerk
ECO	Environmental Compliance Officer
FEFO	First Expiry, First Out
GIS	Geographic Information System
IEC	Information, Education, and Communication
IRS	Indoor Residual Spraying
LLIN	Long-Lasting Insecticide Net
M&E	Monitoring and Evaluation
MEP	Monitoring and Evaluation Plan
NMCP	National Malaria Control Program
PMI	President's Malaria Initiative
PPE	Personal Protective Equipment
RBG	Royal Botanic Gardens
RBM	Roll Back Malaria
RTT	RTT Group, Limited
SEA	Supplemental Environmental Assessment
SIM	Subscriber Identity Module
STTA	Short-Term Technical Assistance
TOT	Training of Trainers
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization
WHOPES	World Health Organization Pesticide Evaluation Scheme

EXECUTIVE SUMMARY

During the second year of the PMI funded Africa Indoor Residual Spraying (AIRS) Madagascar project, indoor residual spraying (IRS) campaigns were completed in 40 communes in the central highlands (CHL) and 6 districts in southern Madagascar. The IRS campaign was completed between November 18, 2013 and December 24, 2013 in the CHL, and January 20, 2014 and March 15, 2014 in southern Madagascar.

AIRS Madagascar made several changes to its previous staffing structure, hiring more staff to assure on-the-ground management of pre-IRS campaign set-up activities, and better supervision of IRS campaign implementation. AIRS Madagascar also re-organized its IRS campaign model, favoring the hire of a smaller number of seasonal staff that would work during the duration of the IRS campaign, and basing the seasonal staff out of centrally located operation sites in each spray district. These changes led to the on-time start of the IRS campaign in both spray areas, a decrease in the total number of days of the IRS campaign, improved performance of the seasonal staff, reducing the number of soak pits and store rooms needed for the IRS campaign, and assuring better inventory control for IRS campaign equipment and insecticides.

AIRS Madagascar also piloted the use of, "mobile soak pits" to assure spray operators could dispose of liquid IRS campaign wastes, and complete daily washing of personal protective equipment (PPE) and rinsing of spray pumps, in an environmentally compliant manner in remote areas. AIRS Madagascar also used mobile technology for collecting operations and environmental compliance data before, during and after the IRS campaign, and for paying seasonal staff in both spray areas.

Unfortunately, insecurity continued to be an issue in some spray areas in the CHL, and especially in southern Madagascar. Due to insecurity and the expansion of gendarme and military actions in Amboasary district, AIRS Madagascar needed to stop all spray activities in the district, and withdrawal from the district after three days of spraying.

The key results achieved 2013-2014 IRS campaigns are listed in Table 1.

TABLE 1: SUMMARY RESULTS OF 2013-2014 IRS CAMPAIGNS

Result	CHL	Southern Madagascar	Totals
Number of communes covered by PMI-supported IRS in 2013-2014	40	88	128
Insecticide	Carbamate and Pyrethroids	Organophosphate	
Number of structures covered by PMI-supported IRS in 2013-2014	82,091	261,379	343,470
Number of structures targeted by PMI-supported IRS in 2013-2014	83,897	263,879	347,776
2013-2014 spray coverage	97.8 %	99.1% %	98.8%

Population protected by PMI-supported IRS in 2013-2014	481,301	1,106,837	1,588,138
Number of people trained with United States Government (USG) funds to deliver IRS[1]	369	465	834

[1] As stated in the AIRS project Performance Monitoring Plan, the indicator for, "The number of people trained with USG funds to deliver IRS," is derived from the number of seasonal staff that attended several pre-IRS campaign trainings (explicitly the Training of Trainers, Spray Operator Training, Clinician/Health Care Worker Training, and M&E Assistant Training). Other IRS campaign seasonal staff, such as data entry clerks, Information, Education, Communication Mobilizers, Spray Pump Technicians, Porters, etc. are excluded. For more information, please see Table 5, "Number of People Trained, Disaggregated by Spray Area" (pg. 10), and indicator 5.1.1 of the Monitoring and Evaluation Plan Indicator Matrix (pg. 70).

,

1. INTRODUCTION

Under its Task Order Four contract with the United States Agency for International Development (USAID), Abt Associates assumed the role of lead implementing partner for the President's Malaria Initiative (PMI)'s AIRS project in Madagascar and 14 other sub Saharan countries. In May, 2013, AIRS Madagascar began implementing activities from its 2013-2014 work plan, to prepare for IRS campaigns in 40 communes in the CHL and 88 communes in southern Madagascar.

The AIRS Madagascar team implemented a variety of changes and re-organization of project staff and supervision of IRS programming. In-turn this led to AIRS Madagascar beginning their IRS work in both regions on-time in 2013-2014, and ending the IRS campaigns close to originally scheduled dates. As described in this report, AIRS Madagascar met insecurity and unrest in some spray areas, especially in southern Madagascar.

This report provides a description of the activities that AIRS Madagascar completed to support the 2013-2014 IRS campaign, key observations that AIRS Madagascar noted before, during and after the IRS campaign, and recommendations to help improve the future work of the AIRS Madagascar during the 2014 IRS campaign. The report also provides the results of the 2013-2014 IRS campaign, including the number of structures sprayed, the number of people protected, and the number of people trained.

1.1 BACKGROUND OF IRS IN MADAGASCAR

PMI has implemented IRS programming in Madagascar since 2008, in line with the National Malaria Control Strategies (2008-2012 and 2013-2017). The National Malaria Strategy aims to implement IRS in 53 districts within the CHL, "Fringe" Districts[2], and the Southern and Western extension[3] regions of Madagascar.

Through 2011, all IRS in Madagascar was categorized as "generalized" spraying or "blanket coverage", providing IRS to as close to 100% of the eligible structures in targeted districts as possible. This IRS strategy has been successful largely through collaboration between PMI and the Global Fund; both donors have provided strong support towards IRS spray programs throughout Madagascar.

The Malagasy National Strategic Plan notes that after the completion of four rounds of "blanketed/generalized spraying" in the CHL, IRS campaigns in the CHL should transition to "focalized" spraying in the communes (sub-districts) that are noted for the highest incident rates of malaria (as noted from Malagasy health system data). The remaining communes in a CHL district would not be sprayed, though entomological monitoring would continue in these communes to monitor the malaria transmission and vector density. Per the National Strategic Plan, PMI and the National Malaria Control Program (NMCP) instructed AIRS Madagascar to spray 40 communes with high malaria incident rates across seven districts in the CHL during the 2013-2014 IRS campaign.

PMI and the NMCP also instructed AIRS Madagascar to continue "generalized" spraying across seven districts in southern Madagascar for the 2013-2014 IRS campaign.

[2] The Fringe Districts consist of areas on the border with the CHL, where due to the variation in elevation and climactic zones, malaria transmission (with lower transmission rates at the higher elevations) and malaria seasons vary.
[3] The Western extension region includes districts between the west coast and the Fringe of the CHL. Spraying has occurred in the area since 2010.

For the 2013-2014 IRS campaign, AIRS Madagascar sprayed in the CHL from November 18, 2013, to December 23, 2013. AIRS Madagascar completed its IRS campaign in the south from January 20, 2014, to March 15, 2014.

Due to USG restrictions during the 2013-2014 IRS campaign, whereby USAID could contribute only towards humanitarian assistance in Madagascar, the AIRS Madagascar project was not allowed to work directly with and/or provide financial and material assistance to the Malagasy government at any level. Thus, the AIRS Madagascar project during the 2013-2014 IRS campaign, only maintained a relationship with the Malagasy government, (specifically the NMCP and district-level health officials) for purposes of planning the IRS campaign.

1.2 Objectives for AIRS Madagascar during the 2013-2014 IRS Campaigns

The AIRS project aimed to meet PMI's objective of covering at least 85 percent of eligible structures found in all communes/districts targeted for spraying.

Listed below were the three key objectives of AIRS Madagascar for the 2013-2014 IRS campaign:

1) Improve the capacity and abilities of the AIRS Madagascar team to effectively supervise and plan for IRS;

2) Improve the capacity and abilities of spray operators and other seasonal staff, specifically in southern Madagascar to complete IRS, and prevent and manage spray campaign issues;

3) Develop stronger logistics systems to limit stock and supply chain error, loss of inventory, and delays in providing needed insecticide and PPE to spray teams.

Listed below in Table 2 are the selected communes in the CHL and the districts in the south that were covered by the 2013-2014 IRS campaign, and their estimated populations.

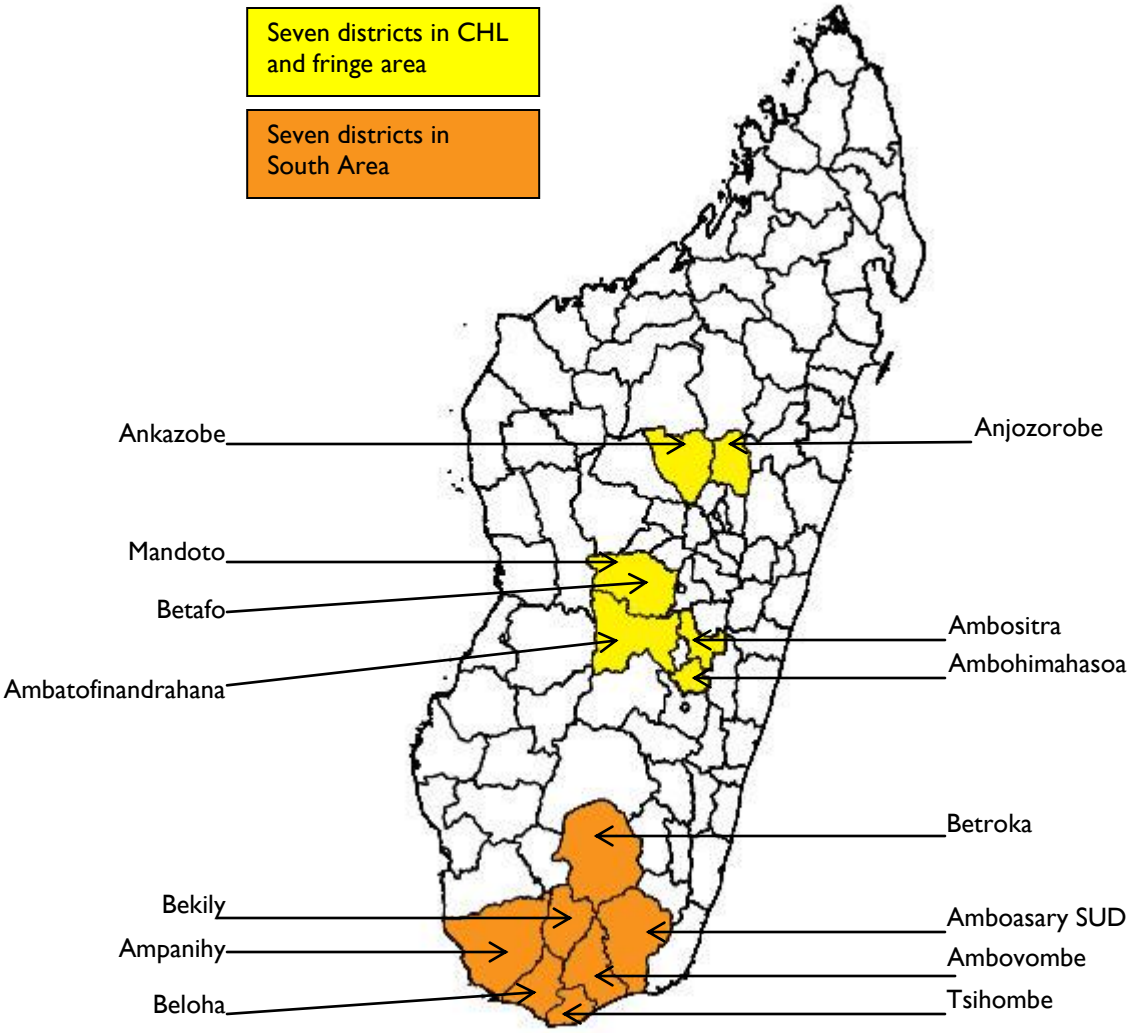
TABLE 2: LIST OF COMMUNES AND DISTRICTS COVERED BY 2013-2014 IRS CAMPAIGN

Region	District	Communes Targeted for IRS	Number of Communes	Total Number of Eligible Structures Found by Spray Operators	Class of Insecticide to be Used during IRS Campaign
Central Highlands (Focalized Spraying)	Ambatofinandrahana	Mangataboahangy, Itremo, and Soavina	3	7,060	Carbamates
	Anjozorobe	Alakamisy, Tsarasaotra, Ambatomanoina, and Androvakely	4	6,571	Carbamates
	Ambohimahasoa	Ankerana, Ampitana, Ankafina Tsarafidy, Manandroy, and Fiadanana	5	10,046	Pyrethroids
	Ambositra	Ambinanindrano, Vohidahy, Imerina-Imady, Ambositra II, Mahazina-Ambohipierenana, Alakamisy-Ambohijato, and Ambatofitorahana	7	9,624	Pyrethroids
	Ankazobe	Fihaonana, Ankazobe, Mahavelona, Tsaramasoandro, Marondry, Kiangara, Antotohazo, Ambolotarakely, and Fiadanana	9	19,944	Carbamates
	Betafo	Andrembesoa, Antsoso, Antohobe, Manohisoa, Ambatonikolahy, and Soavina	6	11,278	Carbamates

Region	District	Communes Targeted for IRS	Number of Communes	Total Number of Eligible Structures Found by Spray Operators	Class of Insecticide to be Used during IRS Campaign
	Mandoto	Anjoma Ramartina, Antanambao Ambary, Vasiana, Betsohana, Mandoto, and Ankazomiriotra	6	19,374	Carbamates
Totals for CHL			40	83,897	
Southern Madagascar (Generalized Spraying)	Amboasary[4]	Behara	1	1,904	Organophosphate
	Ambovombe	Ampamata, Antanimora Atsimo, Andalatanosy, Imanombo, Ambondro, Ambohimalaza, Sihanamaro, Erada, Ambonaivo, Marovato Befeno, Jafaro, Maroalomainty, Maroalopoty, Ambanisarika, Anjeky Ankilikira, Ambovombe, Tsimananada, Anjeky Beanatara, Ambazoa, Vohitany, and Ankilimivory	18	67,472	Organophosphate
	Ampanihy	Maniry, Antaly, Belafike Haut, Fotadrevo, Ejeda, Itampolo, Gogogogo, Androka, Ankiliabo, Amborompotsy, Ampanihy Ouest, Beroy Atsimo, Ankiliabo, and Ankilizato	16	61,547	Organophosphate
	Bekily	Tsikolaky, Beraketa, Morafeno Bekily, Anja Nord, Ambatosola, Ankaranabo Nord, Tanandava, Manakompy, Bekitro, Maroviro, Antsakoamaro, Bevitiky, Ambahita, Belindo Mahasoa, Anivorano Mitsinjo, Besakoa, Beteza, Tanambao Tsirandrany, Vohimanga, and Behabobo	19	40.712	Organophosphate
	Beloha	Marolinta, Tranoroa, Kopoky, Tranovaho, and Beloha	6	25.489	Organophosphate
	Betroka	Ianabinda, Nanarena Besakoa, Beampombo II, Iaborotra, Isoanala, Ianakafy, Mahasoa Est, Benato, Toby, Betroka, Beampombo I, Bekorobo, Sakamahily, Naninora, Andriandampy, Mahabo, Jangany, Ivahona, Analamary, Ambalasoa, Ambatomivary, and Tsaraitso	21	38.412	Organophosphate
	Tsihombe	Tsihombe, Antaritarika, Imongy, Betanty (Faux Cap), Marovato, Nikoly, and Anjampaly	7	28.343	Organophosphate
Totals for Southern Madagascar			88	263.879	
Grand Total			**128**	347,776	

[4] As described in section 4.4, due to insecurity, AIRS Madagascar pulled out of Amboasary district, and only sprayed one of the 16 communes in Amboasary district.

FIGURE 1: LOCATION OF SPRAY AREAS COVERED BY 2013-2014 IRS CAMPAIGN



2. PRE-IRS CAMPAIGN ACTIVITIES

2.1 IRS CAMPAIGN PLANNING

Listed below are the activities that were undertaken to plan and organize the 2013-2014 IRS campaigns:

- District Selection and Insecticide Selection for 2013-2014 IRS Campaigns (April/May 2013): The NMCP consulted with the Global Fund and PMI during several meetings to select which communes and districts would be sprayed by AIRS Madagascar and the Global Fund, and the insecticide to be used in each commune/district. All meeting participants reviewed the entomological surveillance data from the 2012-2013 IRS campaign (particularly wall bioassay and residual efficacy data) and selected pyrethroids and carbamates as the insecticide classes to use for the 2013-2014 IRS campaign in the CHL. It was agreed to use only pyrethroid class insecticides in Ambositra and Ambohimahasoa districts, as pyrethroid-treated long-lasting insecticide net (LLIN) coverage in these two districts is not extensive.

  For southern Madagascar, PMI advocated for the use of long-lasting organophosphate insecticides, as the entomology data gained by AIRS Madagascar regarding the 2012-2013 IRS campaign noted short residual efficacy for carbamate-class insecticide used in the region. Initially, the Roll Back Malaria (RBM) committee was hesitant to approve the use of long-lasting organophosphate-class insecticides in the south, since they had not been approved by World Health Organization Pesticide Evaluation Scheme (WHOPES). However, following the July 2013 WHOPES meeting, approval was provided for long-lasting organophosphate-class insecticide. This led the RBM and NMCP to consent to the use of long-lasting organophosphate-class insecticide in southern Madagascar.

- AIRS Madagascar Retreat (September 2013): Given the hiring of new staff and the change in AIRS Madagascar's system for implementing IRS, all staff attended a retreat in Mahajanga to discuss roles and responsibilities during the 2013-2014 IRS campaign. Staff members also met in smaller groups to discuss how the various staff members would support each other (such as how the operations staff and logistics staff would coordinate during the IRS campaign).

- AIRS Madagascar IRS Campaign Planning (mid-August to October 2013) AIRS Madagascar staff completed several internal staff meetings to plan and organize the IRS campaigns in the south and the CHL. The team put together an Excel file noting the timetable of when each activity to prepare for the IRS campaign would be completed. The resulting spreadsheet was shared with PMI/Madagascar on a weekly basis to assure they were aware of AIRS Madagascar's progress for starting the IRS campaign on-time.

- Micro-planning of IRS Campaign (late October 2013 in CHL and January 2014 in the South) Following the initial training of trainers (TOT) for the IRS campaign, AIRS Madagascar worked with the district coordinators and sector managers to develop the detailed plan of how IRS would be completed in each commune, down to the Fokontany (sub-commune)-level. The micro-planning sessions designated which staff members would be primarily responsible for supervising the IRS campaign in each spray area.

- Meeting with Regional, District Health Officials, Gendarmes, and other Local Officials (October 2013 in CHL, and December 2013 in the South): AIRS Madagascar staff met with regional officials in Analamanga, Vakinankaratra, Amoron'I Mania, and Haute Matsiatra in the CHL; and Anosy, Androy, and Atsimo Andrefana in the south (as the spray areas for the 2013-2014 IRS campaigns are located in these regions), to discuss the schedule for the IRS campaign and the objectives of the IRS

campaigns. In turn, AIRS Madagascar asked for the regional officials to communicate the schedule of the IRS campaigns and the objectives and benefits of the IRS program to the Chef de district.

AIRS Madagascar staff met with district health staff and gendarme brigade commanders before the start of the IRS campaigns to ensure officials were aware of the IRS campaign schedule, and to also ask for assistance in communicating the dates of the IRS campaign to communities. The meeting with the gendarmes in the spray districts also helped AIRS Madagascar become aware of areas with insecurity, where the spray campaign needed to be careful, and provided AIRS contact information. .

2.2 IRS Campaign Commodity Procurement

2.2.1 PPE Procurement

Since AIRS Madagascar decreased the amount of seasonal staff implementing the 2013-2014 IRS Campaign, the project already had plenty of PPE and spray pumps in stock to supply the seasonal staff. The only PPE that was needed was replacement stock, and to gain some spray pump spare parts for repairs. Listed below in Table 3 are the quantities of key PPE that AIRS Madagascar procured for the 2013-2014 IRS campaign. Please see table 21, in the annex for more details on the PPE items that were procured, used, and remaining in stock after the IRS campaign.

TABLE 3: SELECTED IRS COMMODITIES PROCURED FOR THE 2013-2014 IRS CAMPAIGN

Item	Quantity Procured	Procured Locally or Internationally
Aprons	82	Locally
Face Mask (Dust Mask)	3,770 boxes (10 masks per box)	Internationally
First-Aid Kits	234	Locally
Nozzle Tips	315	Internationally
Nozzle Body Caps	250	Internationally
Spray Pump Extension Tubes	170	Internationally
Thermometers	58	Internationally

2.2.2 Insecticide Procurement

Given that AIRS Madagascar had sprayed with pyrethroids and carbamates throughout the CHL and the south during the 2012-2013 IRS campaign, there was considerable insecticide stock in-country to support the 2013-2014 IRS campaign (67,747 sachets of carbamate and 10,384 sachets of pyrethroids). AIRS Madagascar did not need to procure any carbamates for the 2013-2014 IRS campaign. Pyrethroid was also received from the AIRS Liberia program (please section 2.2.3), making it unnecessary for AIRS Madagascar to procure additional pyrethroids.

Since organophosphate had not been sprayed before in Madagascar and would be used in the larger spray area in the south, AIRS Madagascar completed a large procurement of organophosphate for the 2013-2014 IRS campaign (62,200 bottles). The organophosphate bottles arrived in Madagascar on December 9, 2013.

AIRS noted that all of the organophosphate bottles provided to Madagascar by the manufacturer arrived in-country with short-expiration. The four batches that were sent by the manufacturer included bottles that expired in October and November 2014. Please see section 8.2 for further information and the future plans for using these organophosphate bottles.

2.2.3 Insecticide From AIRS Liberia

The AIRS Liberia project ended its IRS programming in 2013, and since AIRS Madagascar was spraying later in the year (AIRS Liberia finished its IRS campaign in May 2013), the AIRS Madagascar project accepted the remaining pyrethroids and organophosphate insecticide in stock in Liberia.

With the help of USAID Madagascar regarding the customs clearance process, 8,756 sachets of pyrethroids and 9,259 bottles of organophosphate arrived in Madagascar in early November 2013.

Since the pyrethroids were going to expire in July 2014, and the organophosphate bottles would have expired in October 2014, AIRS Madagascar followed the principles of first expiry, first out (FEFO), and prioritized the use of AIRS Liberia insecticides for spraying during the first few weeks of the 2013-2014 IRS campaign. By the end of November 2013 all pyrethroid sachets from Liberia were used in the CHL, and by the end of February 2014, all of the organophosphate bottles from Liberia were used in southern Madagascar.

2.3 Setting Up an Office in Ft. Dauphin

A project satellite office was set-up in Ft. Dauphin on October 1, 2013, and staffed with a Finance Manager. AIRS Madagascar established this office to ensure the project had a stronger presence in southern Madagascar and that there was a staff member on the ground to make connections with officials and remain apprised of the security situation in the region. Further, the Finance Manager was able to provide pre-IRS campaign set-up support for southern Madagascar by arranging for vehicle hires in the south, helping to procure some IRS campaign items available in Ft. Dauphin, and working with the Warehouse Manager in Ambovombe to ensure PPE and insecticide kept in Ambovombe was safe and secure and ready for use during the 2013-2014 IRS campaign.

2.4 Contracting Mobile Phone Company for Payments for Seasonal Staff

AIRS noted that the former payment system for IRS campaign seasonal staff in Madagascar was risky as the system entailed having financial staff carry a large amount of cash into the field to make payments. This system was prone to theft and fraud and proved to be expensive, as it required the rental of several vehicles to ensure financial staff could be in the field to continuously make payments. To remedy the project's concerns, AIRS Madagascar paid seasonal staff that had bank accounts with direct wires to their accounts. However, for the majority of seasonal staff that do not have bank accounts, AIRS Madagascar piloted the use of a mobile banking system. AIRS Madagascar began working with a local mobile phone company (AIRTEL) after completing a local tender requesting assistance to implement a mobile payment system.

This system used unique subscriber identity module (SIM) cards provided by the local mobile phone company and were issued to each seasonal staff member that did not have a bank account. The SIM cards were credited with the amount AIRS Madagascar owed the seasonal staff member for the work they completed during the IRS campaign, during set pay dates. AIRS Madagascar authorized the mobile phone company to credit the SIM cards, only after reviewing timecards from all seasonal staff.

For seasonal staff that had mobile phones (estimated to be 75 percent of all seasonal staff), they could use the SIM cards provided by the mobile phone company with their own mobile banking account. However, all seasonal staff, regardless if they owned or do not own a mobile phone were able to take the SIM card to "cash-points" located throughout Madagascar (at stores, restaurants, mobile phone offices, banks, and micro-credit organizations), to receive cash for the amount credited to their SIM card. Overall, 2,120 seasonal staff were paid via the mobile banking system.

AIRS Madagascar and the mobile phone company staff provided training to all seasonal staff on how to use the SIM cards and mobile banking system during the various pre-spray campaign trainings. Additionally, the mobile phone company made staff available in the spray areas, during payment dates (when the SIM cards were issued to seasonal staff); in case seasonal staff needed any assistance.

The mobile banking system provided cost-savings, as AIRS Madagascar only needed to pay a small funds transfer fee to the mobile phone company to issue the SIM cards and credit the SIM cards during pay dates. This was substantially cheaper than renting numerous vehicles and paying for fuel, in order for finance staff to travel around spray areas and complete payments. However, as noted in section 4.42, better communication between AIRS Madagascar staff and seasonal staff regarding the scheduling of mobile banking payments is needed.

2.5 Full-Time Staff Hires

As part of AIRS Madagascar's efforts to better organize and supervise the 2013-2014 IRS campaign, several new staff members were hired. All of these staff members contributed to the ability of the AIRS Madagascar team to start the 2013-2014 IRS campaign on-time, and thoroughly supervise, and problem-solve during the IRS campaigns' implementation. Listed below were the staff members hired and their contributions to the 2013-2014 IRS campaign.

- Operations Manager- Although this position was vacant during the 2012-2013 IRS spray campaign, AIRS Madagascar hired the former AIRS Benin Operations Manager who helped the AIRS Madagascar team improve its organization and supervision of IRS campaign preparation work, the implementation of the IRS campaign, and completing post-IRS campaign activities.
- Operations Coordinator- Having the Operations Coordinator on-staff proved to be helpful for the preparation of the IRS campaigns. Given the short period of time between when the IRS campaign ended in the CHL (late December) and began in the south (mid-January), the Operations Coordinator traveled to the south to begin IRS campaign preparations, while most of the AIRS Madagascar staff remained in the CHL to finish the IRS campaign and complete IRS campaign close-out activities.
- District Coordinators (4 in the CHL; and 7 in Southern Madagascar) - In other AIRS countries, government staff are incorporated into the IRS campaign to supervise spray activities. Since this is not possible in Madagascar, having district coordinators in place (four in the CHL to cover the 40 communes; and 7 in Southern Madagascar (1 per district)), was useful to ensure a staff member was on the ground in the spray areas to concentrate on the preparation, implementation, and close-out of the IRS campaign. Additionally, three of the district coordinators from the CHL, after finishing close-out work for their districts, traveled to southern Madagascar, and helped AIRS Madagascar supervise and complete environmental compliance monitoring of the IRS campaign. This was very helpful given that AIRS Madagascar was without an Environmental Compliance Officer (ECO) during spraying in the south.
- Procurement Manager- Due to the issues with procurement that the AIRS Madagascar project experienced in 2012, the Procurement Manager was hired to lead all in-country procurements (including the procurement of and handling of the project's vehicle rental contracts). Segregating procurement responsibilities from the finance and logistics management of the IRS campaign helped ensure greater transparency for procurement of equipment and services and ease the workload of the finance and logistics teams.

2.6 Seasonal Staff Hires

AIRS Madagascar hired 2,230 seasonal staff workers (874 seasonal staff in the CHL, and 1,356 seasonal staff in southern Madagascar) to implement the 2013-2014 IRS campaigns. Women comprised 22 percent of all seasonal staff for the 2013-2014 IRS campaign, as 481 women were hired in various

positions. This is a decrease from the 2012-2013 IRS campaign when women comprised 24 percent of the seasonal staff (3,583 women were hired for the 2012-2013 IRS campaign). Table 4 provides a breakdown of the number of seasonal staff hired for each position, disaggregated by spray area and gender.

TABLE 4: SEASONAL STAFF WORKERS HIRED, DISAGGREGATED BY GENDER

Position	CHL		South		Total
	Male	Female	Male	Female	
Logistics Assistant	1				1
Financial Assistant	2		1		3
Environmental Compliance Assistant	1				1
Monitoring and Evaluation (M&E) Assistant	4		5	2	11
Data Entry Clerk (DEC)	9	7	13	13	42
Sector Manager	20		24		44
Store Keeper	15	6	10	10	41
Store Room Guard	26		38		64
Team Leader	50	6	65	6	127
Spray Operator	275	6	329	26	636
Washer		28		46	74
Information, Education and Communication (IEC) Mobilizer	172	128	389	138	827
IEC Supervisor			116	59	175
Carrier/Porter	94		48		142
Spray Pump Technician	24		18		42
Total	**693**	**181**	**1,056**	**300**	
TOTAL	**874**		**1,356**		**2,230**

2.7 TRAINING OF SEASONAL STAFF

AIRS Madagascar organized and conducted 23 training sessions (12 in the south and 11 in the CHL) for its seasonal staff. The objective of the trainings was to ensure all seasonal staff was aware of their roles and understood how the IRS campaign would be implemented. Additionally, the training sessions covered the precautions that should be undertaken and what to do in case of emergency situations (such as a poisoning from insecticide). The trainings reinforced to all seasonal staff the value of their work in preventing malaria transmission. All training sessions were led by AIRS Madagascar staff and selected seasonal staff that were trained as trainers. CHL training sessions took place between October and November 2013; all trainings in the south took place between late December and mid-January.

AIRS Madagascar trained 2,241 people (878 people in the CHL and 1,363 people in the south) to implement the 2013-2014 IRS campaigns. Table 5 notes the breakdown of training participants in the CHL and the south.

TABLE 5: NUMBER OF PEOPLE TRAINED, DISAGGREGATED BY SPRAY AREA

Training	Number of People Trained in the CHL	Number of People Trained in the South	Total
Sector Coordinator - Orientation Training/ Training of Trainers	24	25	49
Spray Operator Training	337	426	763
Data Capture Training	16	26	53
M&E Assistant Training (part of Data Capture Training)	4	7	11
Store Keeper Training	21	20	41
Spray Pump Maintenance	24	18	42
IEC Training of Trainers		175	175
IEC Mobilization	300	527	827
Washer Training	28	46	74
Carrier Training	94	48	142
Guardian Training	26	38	64
Training of Private Facility Health Workers and Insecticide Poison Management	4	7	11
Total	**878**	**1,363**	**2,241**

2.7.1 Brief Description of 2013-2014 IRS Campaign Trainings

Sector Coordinator/Orientation Training (October 3-5, 2013, in the CHL; January 6-8, 2014, in southern Madagascar): Sector coordinators were trained extensively on supervision techniques to ensure sector coordinators became effective field managers for the IRS campaign. The training also included demonstrations on how to use mobile soak pits. The training provided sector coordinators an opportunity to discuss with district coordinators how to organize their work during the 2013-2014 IRS campaign.

Training of Trainers (November 4- 9, 2013, in the CHL; January 6-11, 2014, in southern Madagascar): AIRS Madagascar staff trained seasonal staff management positions (including sector coordinators, and M&E Assistants) on the importance of IRS in preventing malaria, spray techniques, ensuring environmental compliance during the IRS campaign, completing data collection forms, how to supervise spray teams, and provide IEC messaging to notify IRS beneficiaries on how to prepare their structures before they are sprayed, and the protocol to follow after their structures are sprayed. Hands-on training was provided regarding the use of mobile soak pits. In southern Madagascar, the training also introduced seasonal staff on how to mix organophosphate in spray tanks and the necessity of completing the triple rinse process for organophosphate bottles after they are emptied into spray pumps. The participants, who completed this training, went on to train the spray operators the week before the IRS campaign started.

Training of the Sprayer Operators (November 11-16, 2013, in the CHL; January 13-18, 2014, in Ambovombe, Amboasary, Beloha, and Tsihombe districts; January 20-25, 2014, in Ampanihy, Bekily, and Betroka districts): Spray operators were trained on the importance of IRS to prevent malaria, correct methods to mix insecticide, best practices in spraying the inside of an eligible structure, the correct use of PPE, how to clean spray pumps and dispose of waste, how to fill in spray operator forms to record IRS campaign data, and IEC messaging to ensure structures were prepared

before spraying and that people did not enter a structure until two hours after spraying. Additionally, hands-on training was provided for all spray operators on how to use, set-up, and clean-up after using a mobile soak pit. For southern Madagascar, the training also introduced spray operators on how to mix organophosphates in their spray pumps, and the necessity of completing a triple rinse for all organophosphate bottles, after they are emptied into the spray pump.

M&E Assistant/Data Capture Training (October 7-10, 2013, in the CHL; December 12-14, 2013, in southern Madagascar): M&E assistants and data clerks gained familiarity with the IRS campaign data entry forms and the system used by AIRS Madagascar to enter spray campaign data into the AIRS Madagascar database. M&E assistants also were trained to use AIRS Madagascar's M&E supervisory forms (data entry verification, data collection verification, and error eliminator tools).

Store Keeper Training (October 28-31, 2013, in the CHL; January 6 -9, 2014, in southern Madagascar): The store keepers were trained on inventory management, the importance of completing and updating stock cards, and the correct protocol for storing PPE and insecticide.

Spray Pump Maintenance Training (November, 16, 2013, in the CHL; January 18, 2014, in southern Madagascar): All spray pump maintenance technicians learned to identify the different components of the spray pumps, and learned how to maintain and repair spray pumps.

Washer Training (November 17, 2013, in the CHL; January 19, 2014, in Ambovombe, Amboasary, Beloha, and Tsihombe districts; January 26, 2014, in Ampanihy, Bekily and Betroka districts): Washers learned techniques to wash PPE correctly and the importance of using PPE properly while completing their work.

Training of Private Facility Health Workers and Insecticide Poison Management (November 7, 2013, in the CHL; January 8, 2014, in southern Madagascar): Since AIRS Madagascar was unable to train Malagasy government health workers during the 2013-2014 IRS campaign, AIRS Madagascar staff trained health workers from private health facilities in each spray district. The training included instructions on what to do in case of insecticide poisonings, skin irritations, and other potential IRS spray campaign injuries. General poison control guidance was provided, with information tailored to health concerns related to pyrethroids and carbamates, and organophosphates.

Carrier Training (November 16, 2013, in the CHL; January 18, 2014, in Ambovombe, Amboasary, Beloha, and Tsihombe districts; and January 26, 2014, in Ampanihy, Betroka, and Tsihombe districts): Carriers learned about their responsibilities and role in helping spray teams complete their work. The carriers were trained on how to transport and help set-up mobile soak pits.

IEC Training of Trainers (January 3-4, 2014, for Ambovombe, Amboasary, Beloha, and Tsihombe districts; January 10, 2014, for Ampanihy, Bekily and Betroka districts): IEC supervisors were trained on the messages to provide, best practices for completing door-to-door mobilization, how to complete the mobilization data collection form, and how to identify eligible structures for the spray campaign. IEC supervisors also learned about methods for supervising IEC and ensuring data collection for noting eligible structures was done correctly.

Please note: this training was not completed in the CHL as AIRS Madagascar assigned their district coordinators and sector coordinators to supervise door-to-door mobilization. However, after noting some difficulties with this system of supervision (see section 3.3); AIRS Madagascar decided to hire IEC supervisors for the spray campaign in the south.

IEC Mobilizer Training (November 9, 2014, in the CHL; January 4-8, 2014, for Ambovombe, Amboasary, Beloha, and Tsihombe districts, and January 13 to 18, 2014 for Ampanihy, Bekily and Betroka districts): IEC mobilizers were trained on the messages to provide and on best practices for completing door-to-door mobilization. Additionally, IEC Mobilizers were trained on filling out mobilization data collection forms and for marking structures. IEC mobilizers in southern Madagascar also were provided new messaging to inform beneficiaries that organophosphates usually leave streaks of white, and possibly an odor, after it is sprayed in a structure.

3. IEC MOBILIZATION

Before and during the IRS campaign, AIRS Madagascar organized advocacy events, worked with mass media channels, produced and distributed various IRS promotional materials, and directly reached out to beneficiaries through door-to-door mobilization to inform them about the schedule for the IRS campaign, and the benefits of IRS for malaria control.

3.1 DOOR-TO DOOR MOBILIZATION

Door-to-door mobilization was completed between November 11-23, 2013, in the CHL, and between January 13, 2014, and February 28, 2014, in southern Madagascar. For the door-to-door mobilization in the CHL, AIRS Madagascar relied on the sector coordinators and district coordinators to supervise activities. However, in southern Madagascar, AIRS Madagascar hired IEC supervisors from the targeted spray communities to supervise door-to-door mobilization. This was completed after noting the supervision in the CHL was not as thorough as the project would have liked (see section 3.3 "Issues with IEC Mobilization" for more information).

AIRS Madagascar made certain to recruit IEC mobilizers (and IEC supervisors in southern Madagascar) who were community members from the spray areas. This provided two advantages: 1) community members know the most efficient way to reach all people in their communities (where to find them, and when they would be home); and 2) this encouraged greater acceptance of the IEC information, given that community members were providing the IEC messaging to each other.

During the door-to-door mobilization IEC mobilizers provided messaging regarding the schedule of the IRS campaign, the benefits of IRS for malaria control, how to prepare a structure for the spray operators, and what to do after a structure has been sprayed (wait two hours before entering the structure, sweep away all dead insects and discard them in a pit or latrine, and do not paint or re-plaster sprayed walls for at least six months). The IEC mobilizers distributed 588,202 IRS leaflets (in Malagasy) to reinforce their messaging. Leaflets were distributed, one per structure visited by the IEC mobilizers, and also to community leaders to pass out to their community members. IEC mobilizers also passed out IRS structure cards for all eligible structures, which were to be used by spray operators to note that a structure was sprayed, and serve as record for the beneficiary that their structure was sprayed). IEC mobilizers also marked all eligible structures with chalk to help the spray operators identify which structures had been mobilized. A total of 338,335 structures were mobilized. During door-to-door mobilization, IEC mobilizers asked beneficiaries if they would accept IRS, and 99 percent of beneficiaries answered positively. Please see Table 6 for more information regarding door-to-door mobilization.

TABLE 6: RESULTS OF DOOR-TO-DOOR MOBILIZATION

Region	Districts	Structures Found	Number of Structures Sensitized by IEC Mobilizers	Percent of Structures Found, Sensitized by IEC Mobilizers	Number of Men Sensitized	Number of Women Sensitized	Total population Sensitized	Number of IEC Leaflets Distributed
CHL	Ambatofinandr-ahana	6,703	6,692	99.84%	13,831	14,995	28,826	10,074
	Ambohimahasoa	10,444	10,419	99.76%	10,093	13,605	23,698	19,313

Region	Districts	Structures Found	Number of Structures Sensitized by IEC Mobilizers	Percent of Structures Found, Sensitized by IEC Mobilizers	Number of Men Sensitized	Number of Women Sensitized	Total population Sensitized	Number of IEC Leaflets Distributed
	Ambositra	10,574	10163	96.11%	11,793	13,727	25,520	18,705
	Anjozorobe	7,016	6,972	99.37%	13,821	14,619	28,440	12,826
	Ankazobe	21,795	21,531	98.79%	32,997	35,610	68,607	37,156
	Betafo	12,965	12,753	98.36%	18,056	20,353	38,409	22,188
	Mandoto	19,146	18,928	98.86%	26,255	30,168	56,423	26,560
	Total	**88,643**	**87,458**	**98.66%**	**126,846**	**143,077**	**269,923**	**146,822**
South	Amboasary	16,380	16,256	99.24%	19,806	24,515	44,321	27,241
	Ambovombe	56,631	56,520	99.80%	78,655	93,535	172,190	99,044
	Ampanihy	63,679	63,619	99.91%	92,789	104,005	196,794	96,152
	Bekily	44,779	44,329	99.00%	52,334	58,099	110,433	83,523
	Beloha	26,904	26,547	98.67%	31,805	37,674	69,479	47,377
	Betroka	30,435	30,428	99.98%	32,614	37,955	70,569	51,019
	Tsihombe	27,264	27,202	99.77%	27,502	35,002	62,504	37,024
	Total	**266,072**	**264,901**	**99.56%**	**335,505**	**390,785**	**726,290**	**441,380**
Grand Total		**354,715**	**352,359**	**99.34%**	**462,351**	**533,862**	**996,213**	**588,202**

3.2 OTHER IEC ACTIVITIES

- **Community Mobilization:** One month before the IRS campaign AIRS Madagascar staff informed community leaders in the CHL and the south about the upcoming IRS campaign, specifically the Chef de District, Chef de Fokontany, religious leaders, mayors, Chef de Centre de Santé de Base (CSB), and traditional leaders about the schedule of the IRS campaign and messaging to communicate to their community members. Messaging topics included the benefits of IRS, how to prepare a structure to be sprayed, and the recommended two-hour wait time before entering a sprayed structure. Additionally, AIRS Madagascar worked with community leaders to identify community members to participate as IEC mobilizers during the door-to-door mobilization efforts.
- **IRS Posters:** IEC mobilizers put up 4,954 IRS promotion posters in highly visible locations, such as markets, government buildings, and the AIRS Madagascar offices. The posters included information on:
    - The IRS campaign's schedule;
    - The advantages of protecting your household from malaria with IRS;
    - How structures should be prepared for the IRS campaign.

FIGURE 2: EXAMPLE OF IRS POSTER PLACED AT A STORE IN SOUTHERN MADAGASCAR

- **Radio:** A total of 1,033 radio spots were completed during the 2013-2014 IRS campaign (418 radio spots in the CHL on eight radio stations, and 615 radio spots in southern Madagascar on nine radio stations). Radio spots were aired several times each week to ensure all communities were aware of when their structures would be sprayed. Radio spots also included information on how beneficiaries should prepare their structures for spraying, and instructions on what to do after a structure was sprayed. Radio shows also promoted the importance of IRS for controlling malaria vectors.

3.3 ISSUES WITH IEC MOBILIZATION

AIRS Madagascar noted that the most common issues during the door-to-door mobilization were:

- Beneficiaries were not at home when IEC mobilizers visited (usually the household occupants were working in their fields or attending market);
- Some potential beneficiaries would not allow a non-family member into their structure;

Although IEC activities were successful, AIRS Madagascar did note the following issues as well as areas for improvement for future IRS campaigns:

- There were delays in the delivery of mobilization materials reaching the IEC mobilizers in the CHL. This led to a late start for door-to-door mobilization in the spray area.
- AIRS Madagascar noted that supervision for the IEC mobilizers in the CHL was not as extensive as needed. Sector coordinators and district coordinators were often too busy to properly supervise door-to-door mobilization, as the sector coordinators and district coordinators needed to attend to other pre-spray activities, such as setting up soak pits and store rooms and attending the IRS campaigns' training of trainers (TOT). This led to AIRS Madagascar to hire additional seasonal staff in southern Madagascar that acted only as supervisors for the door-to-door mobilization, and to

hire dedicated IEC supervisors for the IRS campaign in southern Madagascar. It also led AIRS Madagascar to provide a TOT to ensure IEC supervisors were properly trained to manage and supervise door-to-door mobilization.

4. IMPLEMENTATION OF THE IRS CAMPAIGN

4.1 SCHEDULE OF IRS CAMPAIGN

Following the spray operator trainings, IRS programming immediately began in all spray areas. The spray campaign in the CHL was completed from November 18, 2013, through December 24, 2013, after 31 spray days. In southern Madagascar, the IRS campaign began in Ambovombe, Amboasary, Beloha, and Tsihombe districts on January 20, 2014. Spraying began in Ampanihy, Bekily, and Betroka districts on January 25, 2014, to allow AIRS Madagascar staff a few extra days to ensure all operation sites in these districts were ready for the start of the IRS campaign. All spraying in southern Madagascar ended on March 15, 2014, after 48 spray days.

4.2 RE-ORGANIZATION OF THE IRS CAMPAIGN MODEL

AIRS re-organized its IRS program model in Madagascar after noting inefficiencies during the 2012-2013 IRS campaign. During the 2012-2013 IRS campaign AIRS Madagascar found it difficult to supervise and monitor the work of 14,818 seasonal staff, guarantee environmental compliance at 600 soak pits built at the district and community-levels (including many soak pits built in remote areas), and ensure the security of insecticide and PPE at 150 store rooms. AIRS Madagascar also found the costs of constructing the high number of infrastructure and hiring a large number of seasonal staff to be expensive.

Additionally, the IRS campaign model used during the 2012-2013 IRS campaign was centered around spray operators being employed for only one week to spray their community. While the intentions of this model are a good idea (to have community members be responsible for protecting their own community) AIRS found that spray teams tend to make the most mistakes during their first week of spraying, and with time, spray teams improve the quality of their work and make fewer errors. The community-based system did not allow spray operators the opportunity to improve (even experienced spray operators need practice during the first week of spraying). The mistakes often led to delays in completing work in targeted communities, which led to subsequent delays to other communities because there is a limited amount of PPE in Madagascar that must be shared among the communities. As a result, the 2012-2013 IRS campaign was completed in the CHL two weeks behind schedule, and spraying in southern Madagascar was completed a month and a half behind schedule.

To resolve these inefficiencies, AIRS re-organized the IRS program in Madagascar to mirror the IRS campaign model used in most other AIRS project countries. AIRS Madagascar decreased the number of seasonal staff hired to 2,230, and had all seasonal staff work for the entire spray campaign in their spray area. It's key to note that AIRS Madagascar remained aware of the sensitivities that communities have (especially in southern Madagascar), if people from other districts or far away areas spray their community. For this reason, spray operators were still nominated by community leaders in each district, and spray teams sprayed only within their district or neighboring areas along a district's border.

AIRS Madagascar had all seasonal spray staff base themselves out of two to three large-scale operation sites in each district (usually one site was located in the district capital, and other operation sites were in large towns with good connections to transport routes for the other spray areas in the district). Each operation site had a soak pit and store room large enough to support several spray teams. This led to

decreasing the number of soak pits and store rooms to 41 total (19 in the CHL and 22 in southern Madagascar) for the 2013-2014 IRS campaign, as compared to the building of 859 soak pits and store rooms (217 in the CHL and 642 in southern Madagascar), during the 2012-2013 IRS campaign . The spray teams were required to report to the operation site where they were based each morning. At the operation sites, the spray operators were provided breakfast, and met with the district coordinator, sector coordinators, and other AIRS Madagascar staff supervising work in the district. This provided an opportunity to go over the schedule for which areas would be sprayed during that day, and provide reminders about IRS campaign best practices (such as ensuring spray pumps are pressurized correctly, overalls were untucked from boots, etc.).

Vehicles were provided to the spray teams to transport them to the spray areas, and to return them back to their operation site at the end of the day, where the spray teams completed their rinsing of spray pumps and washing of PPE at the soak pits.

Additionally, having the spray teams based out of centrally-located operation sites allowed for easier review of IRS campaign data by the spray campaign supervisors. Upon returning to the operation sites, spray operators provided their completed spray forms to their team leaders, sector coordinators, and district coordinators for review. Thereafter, the spray forms were sent-over to the district data entry centers (usually in the district capital) for immediate entry into the AIRS Madagascar database.

Overall, AIRS Madagascar found the new IRS campaign model much easier to manage and noted the following improvements from the previous year:

- The smaller number of seasonal staff was easier to monitor, organize, and supervise. AIRS Madagascar staff were able to observe all spray teams during the IRS campaign, and, if needed, could readily provide further training for spray teams that needed more support.
- With spray operators working continuously for several weeks, AIRS Madagascar noted fewer errors and improved technique as the spray campaign continued.
- Fewer errors and better organization led to AIRS Madagascar completing IRS programming in less time than the 2012-2013 IRS campaign. In southern Madagascar, the 2013-2014 spray campaign was completed in 50 fewer days.
- AIRS Madagascar found the new IRS campaign model saved projects costs regarding the following areas:

TABLE 7: SELECTED COST SAVINGS DURING 2013-2014 IRS CAMPAIGN

Area of Cost Savings	Costs during the 2012-2013 IRS Campaign	Costs during the 2013-2014 IRS Campaign	Notes
Soak Pit Construction	$14,100	$6,556	In 2013-2014, AIRS Madagascar used 41 soak pits and 40 mobile soak pits. During the 2012-2013 IRS Campaign, AIRS Madagascar used 759 soak pits.
Store Room Rental	$29,134	$24,195	In 2013-2014, AIRS Madagascar operated 41 store rooms. In 2012-2013, AIRS Madagascar operated 150 store rooms.
Seasonal Staff Payments	$716,576	$419,917	In 2013-2014 AIRS Madagascar hired 2,230 seasonal staff. In 2012-2013, AIRS Madagscar hired 14,830 seasonal staff.
Totals	$759,810	$450,668	

- Having fewer store rooms allowed AIRS Madagascar staff to complete regular stock checks, ensure that stock records were accurate, employ more supervision for store keepers, and closely monitor PPE and insecticide. During the 2013-2014 IRS campaign, there was limited loss of PPE or insecticide.
- With 41 soak pits, AIRS Madagascar could better ensure environmental compliance, especially for progressive rinsing and washing of PPE.

Also included in the re-organization of AIRS Madagascar, was the use of mobile soak pits in remote areas. As noted in section 5.4, the mobile soak pits allowed AIRS Madagascar to ensure correct environmental safeguards and compliance in remote areas and lessen the project's environment footprint in the spray areas.

Listed below in Tables 8 and 9 are the number of spray teams and spray operators used during the 2013-2014 IRS campaign, and the location of the soak pits and store rooms used during the 2013-2014 IRS campaign.

TABLE 8: NUMBER OF SPRAY TEAMS PER DISTRICT

Region	District	Number of Spray Teams	Number of Spray Operators
CHL	Ambatofinandrahana	5	25
	Ambohimahasoa	6	30
	Ambositra	9	45
	Anjozorobe	4	20
	Ankazobe	14	70
	Betafo	8	40
	Mandoto	10	50
	Total for CHL	**56**	**280**
	Ambovombe	24	120
	Ampanihy	15	75
	Bekily	10	50
	Beloha	6	30
	Betroka	9	45
	Tsihombe	7	35
	Total for South	**71**	**355**
Grand Total		**127**	**635**

TABLE 9: LOCATION OF SOAK PITS/ STORE ROOMS USED DURING THE 2013-2014 IRS CAMPAIGN

Spray Area	District	Location of Soak Pit/ Store Rooms
CHL	Ankazobe	Ankazobe, Fiaonana,Kiangara, and Fiadanna
	Anjozorobe	Alakamisy, and Ambatomanoina
	Betafo	Soavina, Ambatonikolahy, and Andrembesoa
	Mandoto	Mandoto, and Anjoma- Ramartine
	Ambositra	Ambositra,Ambinandrono, Mahazina, and Vohidahy
	Ambatofinandrahana	Soavina and Itremo,
	Ambohimahasoa	Ambohimasoa and Fiadanna
	Total	**19**
South	Ampanihy	Androka, Ejeda, Fotadrevo, andAmpanihy
	Ambovombe	Ambovombe, Maroalypoty, and Antanimora
	Tshiombe	Tsihombe and Betanty
	Beloha	Beloha and Beabobo
	Bekily	Bekily, Beraketa,and Bekitro
	Betroka	Betroka, Analamary, Isoanala, and Djangany
	Amboasary[5]	Amboassary, Ebelo, Tsivory, Maromby
	Total	**22**
Grand Total for CHL and South		**41**

4.3 IRS CAMPAIGN SUPERVISION

IRS campaign supervision was conducted by the full-time AIRS Madagascar staff and several seasonal staff positions, chiefly the team leaders and sector coordinators. Supervision was reinforced by the use of supervision checklists that AIRS Madagascar staff completed on smart phones, and seasonal staff completed via paper forms. The supervision checklists provided reminders of key activities that should be completed daily during the spray campaign, and the various IRS campaign policies and standards according to PMI's Best Management Practices (BMP). The checklists also assessed the daily performance of spray operators. AIRS Madagascar staff completed daily conference calls (usually over Skype) to discuss spray campaign progress and various issues that needed to be resolved.

Listed below is the hierarchy of supervision for the 2013-2014 IRS campaign:

- Spray operators were grouped into teams of five. Each team was supervised by a team leader. The team leader observed and monitored all spray activities, including the use of PPE, ensuring structures were sprayed correctly and making certain progressive rinsing of spray pumps and washing of PPE was completed at the soak pits or mobile soak pits.
- Sector coordinators supervised spray teams' work in three to five communes (depending on the number of eligible structures to be sprayed, and the terrain that the spray campaigns would cover). The sector coordinators were in the field daily supervising all IRS spray operations in their communes, and monitoring activities at the operation site before and

[5] Originally opened before the spraying was closed in the district due to insecurity.

after the spray day to ensure activities met BMP and project standards for the IRS campaign. Sector coordinators also either met with or spoke to the district coordinators daily to update them on spray progress, issues spray teams encountered in the field, and other issues noted at the operation sites.

- The AIRS Madagascar district coordinators supervised all seasonal staff in their district and were responsible for ensuring spraying was completed on-schedule. The district coordinator also checked with store keepers to ensure the inventory of PPE and insecticide at the operation sites was sufficient. If not, the district coordinator called the AIRS Madagascar logistics team at the central warehouses and requested to receive a re-stock of needed PPE and insecticide. The district coordinators also spent time in the field daily observing the IRS campaign, and providing logistical and programmatic support. The district coordinators were in daily communication with the Operations Manager and the Operations Coordinator to discuss spray progress each day, problems spray teams encountered in the field, and to note insecticide and PPE stock on-hand.
- AIRS Madagascar staff including the Chief of Party, Operations Manager, Operations Coordinator, and Technical Director/Entomologist were in the field throughout the IRS campaign, monitoring spray operations, ensuring environmental compliance and the safety of seasonal and full-time staff, and providing problem-solving and support for the district and sector coordinators. The Operations Manager and Operations Coordinator also closely tracked the number of structures sprayed per district, and the number of insecticide sachets/bottles used to ensure enough stock was available.
- The logistics manager was also in the field for both spray campaigns, organizing the transport of PPE and insecticide to all operation sites and keeping in close contact with the store keepers to understand what was in stock and what was needed at each operation site.
- Additionally, three of the district coordinators from the CHL provided support for the southern Madagascar IRS campaign. Two CHL district coordinators provided further support for IRS campaign activities in Ampanihy and Betroka districts as these districts are noted for being the most difficult, due to the districts' size and limited transportation routes. The third CHL district coordinators provided support for the Logistics Manager, ensured stock records (especially at the central warehouse in Ambovombe) were correct, and helped arrange refill trips to each operation site.

4.4 Security/Incidents Issues During the 2013-2014 IRS Campaign

Similar to the 2012-2013 IRS campaign, AIRS Madagascar was informed by district and local officials that several communes and Fokontany could not be sprayed due to insecurity and dangerous conditions in these areas related to continued gendarme and military action against armed bandits involved in cattle theft. AIRS Madagascar noted their inability to spray the communes and Fokontany in their weekly spray reports. Listed in Table 10 are the spray areas that AIRS Madagascar was unable to spray due to insecurity. The number of structures in the insecure areas was removed from AIRS Madagascar's total number of targeted structures for the 2013-2014 IRS campaign.

TABLE 10: TOTAL NUMBER OF ELIGIBLE STRUCTURES NOT SPRAYED DUE TO INSECURITY

Spray Area	District	Commune	Fokotany	Estimated Number of Eligible Structures Not Sprayed	Estimated Population
CHL	Betafo	Andrembesoa	Lazarivo, Vatogaga, and Antananolofotsy	373	1,865
Southern Madagascar	Amboasary	Tomboarivo, Mahaly, Tranomaro, Ranobe, Elonty, Ifotaka, Marotsiraka, Tsivory, Tanandava Sud, Manevy, Maromby, Ebelo, Esira, and Sampona	All Fokontany within the communes	37,609	159,086
	Ambovombe	Imanombo	Ambalatany I, Ambalatany II, Ambaninato I Ambaninato II Ampasimaiky, Bedaro, Mahazoarivo, Ampanasa, Anafondravoay Analasoa, Analavondrovey, Andemby I Andemby II, Andranovola, Ankelevohitse Antanile Antefanoroke, Antehalomboro Antesomay, Antrakoamalangy, Antrakomalangy, Betsiriry Nord, Finday, Iaborano Kalady, Kalady Fima, Mitsinjo, Tsiholaka II, Tsikolaka I	1,955	8,993
		Tsimananada	Botreoke centre, Botreoke II, Amboanemba Marolava, Amboanemba II, Amboanemba Central, Soalioke, Ambitika Analavelo, Ambitika II, Ankasy Betaranta, Ambaroanonoke, Ambitika Antsakoamasy, Maroafo Marofoty, and Marofoty Entantizoke	548	2,521
	Betroka	Tsaraitso	Taperapia, Ambondro II, and Bemaha	382	1,604
			Total	40,867	174,069

4.4.1 PULL-OUT FROM AMBOASARY DISTRICT

Insecurity continued to increase in southern Madagascar during 2013 and 2014. To ensure the project was aware of security issues, AIRS Madagascar staff held calls with senior staff at Catholic Relief Services and CARE International (as both organizations work in southern Madagascar) regularly, before and during the IRS campaign, to learn of any updates about areas that had become insecure or dangerous. AIRS Madagascar staff was also in regular contact with district and gendarme officials to understand the security situation in the spray areas.

AIRS Madagascar needed to halt all spray operations in Amboasary district after the first few days of the IRS campaign. This decision was made after several weeks where continued insecurity began limiting the areas that AIRS Madagascar could spray in the district. Listed below are the events that led to AIRS Madagascar's decision to stop IRS campaign work in Amboasary:

- On December 28, 2013, the AIRS Madagascar Amboasary district coordinator was north of Amboasary-ville scouting locations for operation sites and soak pits when he was asked by local

and district officials to return to Amboasary-ville. The officials had noted that armed bandits had killed 10 people north of Amboasary-ville the previous day, and the gendarmes were preparing to find and confront the armed bandits. The Chef de District asked AIRS Madagascar to stop work to develop operation sites north of Amboasary-ville, and to be very vigilant when traveling around the area.

- On January 17, 2014, the Amboasary Chef de District requested that AIRS Madagascar cease all activities in communes north of Amboasary-ville, due to an upcoming military campaign against armed bandits. The Chef de District recommended that AIRS Madagascar limit all IRS campaign activities to the immediate area around Amboasary-ville, until further notice.
- During the second day of the IRS campaign on January 21, 2014, two spray teams and the driver for another spray team were stopped by armed bandits.
    - The first team was stopped by armed bandits while returning from Tanambao (about 8km away) from Amboasary-ville). The bandits allowed the spray team to pass, after they could confirm that no "outsiders" or foreigners were with the spray team.
    - The second spray team was stopped by armed bandits while returning from Behara commune (about 15km away). The armed bandits demanded money in order to pass their roadblock.
    - The driver for another spray team was also approached by armed bandits near Behara-ville while the spray team was out in the community completing their work. The bandits again asked for money to allow the driver to continue his work. After being released by the bandits, the driver immediately found the spray team, and everyone agreed to return to Amboasary-villle immediately.
- During the third day of the IRS campaign, January 22, 2014, three spray teams were stopped within 15km from Amboasary-ville by armed bandits while heading out to spray areas in the morning. The armed bandits all asked for 10,000 Ariary in order for the spray teams to pass their roadblocks. Following the release of the spray teams by the armed bandits, all three spray teams immediately returned to Amboasary-ville and met with the district coordinator, the AIRS Madagascar Operations Coordinator, and Amboasary district officials. The district officials asked AIRS Madagascar to stop work in seven additional Fokontany to the south, north, and east of Amboasary-ville, and warned AIRS Madagascar that a major army campaign was about to start in the district on January 23, 2014. The new restrictions limited AIRS Madagascar's work to spraying four Fokontany immediately around Amboasary-ville.

Given the increased insecurity and limited spray area, AIRS Madagascar senior staff met on the evening of January 22, 2014, and decided to stop spray activities in Amboasary district, after the four Fokontany around Amboasary were sprayed. AIRS Madagascar informed PMI about their decision on January 22, and informed the NMCP about their decision on January 23. The AIRS Madagascar Operations Coordinator also met with Amboasary district officials to explain the decision on January 23.

On January 24, the spray teams finished spraying the four Fokontany around Amboasary-ville and officially ended spraying in the district. Additionally, the entomology team that intended to start work in Amboasary district relocated to Ambovombe-ville to begin their entomological surveillance work for the IRS campaign in southern Madagascar.

On January 25, a final inventory count of all IRS campaign equipment and insecticide was completed at the store room in Amboasary, with all equipment and insecticide sent to the central warehouse in Ambovombe. Seasonal staff in Amboasary district met with the district coordinator and operations Coordinator on January 25 and was given the choice of being paid for the number of days they had worked, or to continue working on the spray campaign in several communes in Ambovombe district that border Amboasary district. Overall, 81 of the 83 seasonal staff in Amboasary, including 55 spray operators, 11 team leaders, four sector coordinators, four store keepers, three data entry clerks, three

washers, and one M&E assistant agreed to continue working, and were transported to Ambovombe to begin work on January 27. The two spray operators who did not want to continue working were paid by AIRS Madagascar for the number of days that they had worked on January 26.

On January 26, the only operation site that AIRS Madagascar used for supporting IRS activities in Amboasary district – the operation site located in Amboasary-ville – was closed down. A cement cover was placed on the soak pit, and the store room was cleaned and locked.

4.4.2 Other IRS Campaign Incidents

AIRS Madagascar experienced several incidents that challenged spray operations during the 2013-2014. All incidents listed in Table 11 were described in the AIRS project standard incident reports which were submitted to PMI.

TABLE 11: INCIDENTS DURING THE 2013-2014 IRS CAMPAIGN

District	Date of Incident	Brief Description	Actions/Future Actions taken by AIRS Madagascar
Ankazobe	November 18, 2013	A spray operator fell down a flight of stairs while spraying the inside of a structure. The spray operator was later diagnosed with a concussion, and asked to rest for a few days.	AIRS Madagascar staff spoke with spray operators in the CHL and reminded them to be careful when spraying inside structures, and to ask the owners of the structures if there are any furniture or other obstacles to be mindful of, inside their structures.
Ankazobe	November 19, 2013	A rented vehicle carrying spray operators was caught in a flash flood while crossing a streambed. The driver and spray operators were able to escape the vehicle, and make it to the other side of the stream safely. When the stream subsided, the driver was able to start the vehicle and get it out of the stream, however, some IRS campaign materials (flashlights, staplers, face masks, pair of gloves and socks, markers, a calculator and pens were washed away). Most notable a stack of completed spray cards was damaged.	Spray operators returned to the village that had just been sprayed, and recollected the lost data. AIRS Madagascar staff spoke with spray campaign drivers and asked them to be cautious and assess road conditions carefully, and not commit themselves to risky situations.
Road between CHL and southern Madagsacar	January 13, 2014	A rental vehicle transporting an AIRS Entomology team from one sentinel site in the south to another sentinel site in the CHL was involved in a serious car accident when a broken down vehicle on the right side of the road was being pushed back into the roadway. Two of the AIRS Entomology team's staff members were injured (sustaining a broken arm and concussions) and required medical attention at a local hospital.	As this was an unfortunate and unexpected accident, AIRS Madagascar asked drivers to be as alert as possible, and reminded staff to always seek medical attention if they are injured.
Ampanihy	January 23, 2014	Vehicle carrying the district coordinator for Ampanihy was stopped by two men armed with rifles, demanding money to pass through a roadblock. The district coordinator and her driver were able to talk their way out of the situation, and were able to pass unharmed.	AIRS Madagascar senior staff asked the district coordinator to report the incident to district officials, and asked the district coordinator to remain vigilant, and not to travel to areas that were noted for insecurity.
Tsihombe	January 24, 2014	Vehicles carrying the Chief of Party (COP) and AIRS Madagascar finance staff were stopped at two roadblocks by two armed men, who threatened staff if they did not receive money..	The COP informed district officials about the situation, and continued to gain updates on the security situation in Tsihombe, and learn of areas where increased vigilance was needed.

Ambovombe and Ampanihy	January 28, 2014	A theft of progressive rinse barrels occurred at the Ambovombe warehouse during the night. Three of the six progressive rinse barrels that were stolen contained small amounts of insecticide waste water residue (from rinsing the spray pumps the previous day). One of the thieves was cornered by the security guards at the warehouse during the theft, and was turned over to the gendarmes. Other arrests were made regarding the theft in the subsequent weeks, however, the gendarmes have not been willing to release any further information, and the barrels were not recovered. Three thieves attempted to break into the operation site compound in Ejeda, however the security guard at the operation site was able to scare away the thieves before anything could be stolen. The district coordinator for Ampanihy spoke to other local NGOs about the incident, which noted that the progressive rinse barrels left in the soak pit area are likely what attracted the thieves.	In Ambovombe, AIRS Madagascar realized the significant risks of contaminated stolen progressive rinse barrels, and worked with local radio stations to broadcast a warning not to buy any barrels that match the description of the stolen barrels, and to not fill any barrels with water that are not known to them and/or match the description of the stolen barrels Following the theft and attempted theft, AIRS Madagascar instructed all spray teams to move progressive barrels inside store rooms at the end of the spray day, and moved forward with increasing security at all operation sites, by improving fencing, adding large iron gates to the front of store rooms, and hiring more guards at operation sites.
Ampanihy	February 17, 2014	Regrettably, a spray operator was found dead in their home. Upon examination by a doctor, it was noted that the spray operator had died overnight of a cardiac aneurysm.	The AIRS Madagsacar Operations Coordinator traveled to the spray operator's home community to express condolescences on behalf of the project. Additionally, the Operations Coordinator spoke with community members to assure them that the IRS campaign was safe, and arranged to speak on several radio stations, to explain what had happened, and that the death of the spray operator was not related to his work on the IRS campaign. The radio programs helped ensure confidence in the IRS program, as AIRS noted that there were no refusals in these communities during spraying.
Ambovombe	February 27, 2014	Spray operators and team leaders became angry and threatened AIRS Madagascar staff for not receiving their pay. During spray operator training, it was explained that spray operators in Ambovombe district would be paid during the week of February 24 (although a specific date was not set), when spraying was scheduled to finish in the district. The AIRS Madagascar Chief of Party and Operations Manager met with the Mayor of Ambovombe and the gendarmes, who helped to diffuse the situation. AIRS Madagascar also pushed forward with organizing pay for all seasonal staff in Ambovombe on March 1.	As a result of this incident, AIRS Madagascar staff agreed they need to communicate more openly with the spray operators and update them regularly on the status of their payment.
Ampanihy	March 6, 2014	Spray operators went on strike for part of the day, and threatened AIRS Madagascar staff because they did not understand when they would receive payment. The previous district coordinator for the district (who was fired in late February for poor performance) had told the spray operators that they would be paid in February. Whereas, AIRS Madagascar had originally noted	AIRS Madagascar staff agreed that they need to communicate more openly with seasonal staff about pay dates, and complete better organization to assure payments are made on-time.

		during the spray operators' training that spray operators would be paid in March at the end of the IRS campaign. The mayor of Ampanihy and the gendarme brigade commander helped AIRS Madagascar to diffuse the situation. The spray operators went back to work once AIRS Madagascar agreed to push up payments to March 10.	

5. Environmental Compliance

5.1 Amendment to Supplemental Environmental Assessment

An amendment to the supplemental environmental assessment (SEA) for Madagascar was developed in August, 2013, by the AIRS Madagascar ECO, and the Environmental Compliance Manager from the AIRS Core team. The amendment was approved by the Africa and Global Health Bureau Environmental Officers and the Regional Environmental Advisor in September, 2013. The SEA was needed, since organophosphate insecticides were used during the 2013-2014 IRS campaign, and the SEA for Madagascar did not include authorization for the use of organophosphate-class insecticides. In addition, modifications were needed to the guidance for spraying in environmentally-protected areas, as the number and size of these areas are growing rapidly in Madagascar and a significant portion of the targeted population live within them.

5.2 Environmental Compliance Assistance for the Spray Campaign in the South

Regrettably, the AIRS Madagascar ECO and seasonal staff Environmental Compliance Assistant were both found responsible for financial misconduct and subsequently dismissed from the project in late-December 2013. In order to fulfill the environmental compliance monitoring work normally completed by the ECO and the Environmental Compliance Assistant, AIRS Madagascar completed the following:

- The Operations Manager and COP stayed behind in the CHL and focused on completing the post-spray environmental compliance inspections and closing-down soak pits and store rooms;
- Following the close-out of their districts, two of the CHL district coordinators were sent to southern Madagascar to assist with pre-spray environment compliance assessments and ensure the correct set-up of soak pits and store rooms. During the IRS campaign, the two district coordinators remained in southern Madagascar and assisted with environmental compliance monitoring in various districts.
- The AIRS Senegal ECO completed a short-term technical assistance (STTA) trip from January 11 to February 7, 2014, to support the AIRS Madagascar team. During this STTA trip, the AIRS Senegal ECO helped with soak pit and store room preparations throughout the spray areas in southern Madagascar. She also worked with the AIRS Madagascar COP, Operations Manager, and Operations Coordinator to ensure they were able to complete the Pre-Season Environmental Compliance Assessment via the smart phones, and completed one-on-one trainings with the AIRS Madagascar Operations Coordinator, and the two district coordinators from the CHL on environmental compliance monitoring. During the first two weeks of the IRS campaign, the AIRS Senegal ECO shadowed the Operations Coordinator and the two district coordinators from the CHL to ensure they were completing environmental compliance monitoring well and to answer their questions. The STTA trip also allowed the AIRS Senegal ECO to gain first-hand experience working with mobile soak pits. This proved to be beneficial as AIRS Senegal plans to use mobile soak pits during their 2014 IRS campaign.

5.3 Pre-Spray Environmental Assessment

AIRS Madagascar completed pre-spray environmental assessments in the CHL between October 21 and November 17, 2013; and in southern Madagascar between January 6-30, 2014). The assessments were completed using smart phones, which were pre-programmed with environmental assessment checklists.

The pre-spray environmental checklist on the smart phones provided questions to ensure that operation sites particularly soak pits and store rooms, were set-up correctly. The checklists also guided AIRS Madagascar staff to ensure all PPE and insecticide were delivered and safely and securely stored at the store rooms and that seasonal staff supporting the store rooms and soak pits (such as guards, washers, and store keepers) had been properly trained.

The smart phones also collected data on the geographic information system (GIS) coordinates of each operation site visited, and required a picture to be taken of the soak pit and store rooms to ensure they were in ready-condition.

Data that was entered on the pre-spray environmental checklist via the smartphones was uploaded to a central database when Internet or Wi-Fi access was available. This allowed AIRS Madagascar staff and the AIRS Core team to view the status of the set-up of soak pits and store rooms and the training and storage of IRS commodities. Additionally, after the data was uploaded to the database, an email was sent out to the AIRS Madagascar COP, Operations Manager, ECO, and AIRS Core staff to guide the AIRS Madagascar team on the remaining work that needed to be completed in the spray areas to ensure the soak pits and store rooms were ready for the IRS campaign (such as ensuring bars were placed on store room windows, or insecticide was stored on pallets in the store room). Emails were also sent-out to staff noting when a soak pit and store room was ready (when all issues on the pre-spray environmental assessment checklist were satisfied).

Also, per the amended AIRS Madagascar SEA, AIRS Madagascar sent letters to the managers of all protected areas located within IRS campaign spray districts. The letters noted that AIRS Madagascar was planning to spray border and buffer areas around the managed area. The letters also invited the managers of the protected areas to assist with identifying the borders of the protected core areas that should not be sprayed and to observe and supervise spray activities near their protected areas. Listed in Table 12 are the protected areas within the 2013-2014 IRS campaign districts in the CHL and southern Madagascar.

TABLE 12: PROTECTED AREAS AIRS MADAGSACAR NOTIFIED REGARDING THE 2013-2014 IRS CAMPAIGN

Spray Area	Protected Area	District	Manager of Protected Area
CHL	Reserve Speciale Ambohitantely	Ankazobe	Madagascar National Park
	Corridor Fandriana-Marolambo	Ambositra	Madagascar National Park
	Parc National Tsimanapetsotsa	Ampanihy	Madagascar National Park
	Nouvelle aire Protegee Anjozorobe-Angavo	Anjozorobe	Association Fanamby
	Nouvelle aire Protegee de Massif d'Itremo	Ambatofinandrahana	Royal Botanic Gardens (RBG)- Kew
South	Menarandra Forest	Ampanihy	Ministere de l'Environnement et Foret
	Nouvelle aire Protegee Complexe Betsimalao-Anadabolava	Amboasary	Missouri Botanical Garden
	Lake Anony & Erombo, Buffer zone Lake Anony & Erombo	Amboasary	Ministere de l'Environnement et Foret
	Parc National Andohaela	Amboasary	Madagascar National Park
	Nouvelle Aire Protégé d'Ankodida	Amboasary	World Wildlife Foundation

Spray Area	Protected Area	District	Manager of Protected Area
	Extension Ala Maiky Ankodida - Tranomaro, Complexe Behara-Tranomaro, Extension Ala Maiky Ankodida-Tsimelahy	Amboasary	(WWF)
	NAP Ekintso, Nord Ifotaka, Extension Ala Maiky Ankodida - Tranomaro, Sud Ouest Ifotaky	Ampanihy	
	Angavo	Ampanihy	
	Extension Ala Maiky Ampamalora, Buffer Zone Sud Ouest Ifotaka II	Ampanihy	
	Ambia, Ekintso, Beompa, Tirimena-Voamaingotse	Ampanihy	
	NAP Vohimena	Ampanihy	
	NAP Marobasia	Ampanihy	
	Plateau Mahafaly	Ampanihy	
	NAP Anena	Beloha	Ministere de l'Environnement et Foret
	Site Koloala	Tsihombe, Beloha	Ministere de l'Environnement et Foret
	Reserve Speciale Cap Sainte-Marie	Tsihombe	Madagascar National Park

5.4 Mobile Soak Pit Pilot

During the 2012-2013 IRS campaign, AIRS Madagascar built more than 600 soak pits. This effort proved to be expensive, a significant drain of labor, and nearly impossible to successfully monitor, especially since most of the pits were in remote areas and rarely used for more than one week. Additionally, since there are some spray areas in the CHL and the south that are accessible only via foot and/or river-crossing, it is challenging for spray teams to cover these areas and travel back to a soak pit site to rinse spray pumps, dispose liquid wastes, and wash PPE. It is more efficient for spray teams to stay out in the field over 1-3 days to access multiple remote targeted villages.

In this situation, building a standard soak pit may be too resource-intensive, especially with regard to transporting soak pit materials into the locality in which they are built. In addition, these soak pits are difficult to monitor before, during, and after the IRS campaign to guard against theft and unauthorized usage of the charcoal. They also may be too large, given that a spray team may be in the area for only a few days.

For these areas, rather than build a small soak pit that would be used for three days at most while a spray team is in the remote area, AIRS Madagascar piloted a new AIRS project innovation: the mobile soak pit. This is essentially a small box with a hole in the bottom, containing screens, sawdust, activated charcoal, stone, and a secure cover. The activated charcoal in the mobile soak pit is capable of absorbing the insecticide in the liquid wastes, while the other materials provide particulate filtration, flow control, and degradation capacity. Initial versions of the mobile soak pit have been small enough for spray teams to carry them to remote areas without difficulty.

During the spray campaign, the spray team liaised with community leaders to choose a nearby site and prepare a wash area for the end-of-day cleanup. With community assistance, the spray team porters dug

a small hole in the center of a 4m x 4m area that was sloped gently to the center from all sides. The mobile soak pit was placed into the hole, and a tarpaulin was laid down around the hole so that any dripping from washing drained to the soak pit for treatment. After the final day in a given spray area, the spray team dug up and removed the mobile soak pit, filled in the hole, packed up the tarpaulin, and traveled to the next spray area. When the spray team traveled back to their operation site, the spray team stored the portable soak pit in a water-tight box, and allowed the charcoal to continue to break down the insecticide and renew itself for the next season.

Listed in Table 13 are the number of mobile soak pits that were used during the 2013-2014 IRS campaign and the number of days the mobile soak pits were used in each district. It's important to note that AIRS Madagascar built 40 mobile soak pits for the IRS campaign. All of the mobile soak pits used during the spray campaign in the CHL were later used during the spray campaign in southern Madagascar.

TABLE 13: LOCATION AND DURATION OF USE OF MOBILE SOAK PITS

Region	District	Number of Mobile Soak Pits	Number of Days Mobile Soak Pits were Used
CHL	Ankazobe	9	10
	Anjozorobe	4	13
	Betafo	5	28
	Mandoto	6	21
	Ambositra	6	15
	Ambatofinandrahana	3	15
	Ambohimahasoa	3	8
	Total	36	
South	Ampanihy	9	10
	Ambovombe	6	38
	Tshiombe	2	15
	Beloha	3	15
	Bekily	6	22
	Betroka	4	25
	Total	30	

5.5 Environmental Inspections During the IRS Campaign

During the IRS campaigns, AIRS Madagascar staff completed inspections to make certain that spray operations adhered to environmental compliance standards specified by the BMP. The inspection was completed via checklists loaded onto the smart phones.

AIRS Madagascar staff assessed: the use of PPE, progressive rinse of spray pumps, washing of PPE, the vehicles used for transporting spray teams and insecticide, storage conditions of PPE and insecticide, and

that correct safety precautions (such as a store room posting warning signs) were followed. AIRS Madagascar staff also monitored that IRS campaign wastes were handled and stored correctly, store room inventory records were correct, spray operators used correct techniques, and noted if beneficiaries had been provided with sufficient and clear information to ensure they were informed about the IRS campaign and knew how to prepare their structures for spraying. AIRS Madagascar staff also checked on the condition of soak pits and mobile soak pits, particularly their flow rate and drainage. Overall, AIRS Madagascar staff found that spray operations were satisfactory, and few environmental compliance issues were noted. Listed in Table 14 are the non-compliance issues that were observed by AIRS Madagascar staff during the 2013-2014 IRS campaign, and the actions taken to correct the issues.

TABLE 14: ENVIRONMENTAL COMPLIANCES ISSUES NOTED DURING THE IRS CAMPAIGN

Issue	Districts	Actions Taken by AIRS Madagascar
Spray operators were found eating/drinking while wearing their PPE	Ankazobe	The district coordinator provided message reinforcement that spray operators are not allowed to eat while wearing PPE due to risks of contamination.
Progressive rinse barrels 1,3, 5, and 7 were not empty at the beginning of the spray day.	Ambovombe, Bekily	AIRS Madagascar staff (specifically the operations manager, operations coordionator, and district coordinators) worked with the spray teams to ensure that they use any extra water in those barrels for filling up their spray tanks before heading into the field and that the barrels were empty and ready for use during progressive rinsing.
Spray operators complained of irritation (sore eyes, sore throat, itchy skin)	Ambovombe, Ambositra, Ambatofinandrahana, Ankazobe	AIRS Madagascar staff reminded spray operators to wear PPE correctly and corrected spray operators who did not wear PPE properly. AIRS Madagascar also provided refresher trainings to remind spray operators how to treat and wash irritated areas and to seek treatment viaeach operation sites' first aid kits.
Soak pit was found to be not draining quickly due to the build up of silt/mud in the soak pit area.	Tsihombe, Bekily	To resolve this issue, AIRS Madagascar staff made spray operators rinse off their boots in wash basins before they entered the soak pit area. Addiitionally, plastic flaps (with small slits) were placed over the soak pit to make sure mud would be blocked from entering the soak pit.
Storekeepers were found eating in store rooms.	Mandoto, Bekily, Ambovombe, Ambositra	The district coordinator spoke with the store keepers and informed them that eating is not allowed in the store room due to risks of contamination. The store keepers were warned that if they were caught eating in the store room again they risked being fired.
Pallets for storing insecticide were repaired.	Tsihombe, Beloha, Ambovombe, Anjozorobe	Several store rooms received poor quality pallets at the start of the IRS campaign. When possible AIRS Madagascar staff bought materials (nails and wood planks) and helped the store keepers to repair the pallets.
Insecticide was not mixed in front of	Betroka, Anjozorobe,	District and sector coorinators met with

Issue	Districts	Actions Taken by AIRS Madagascar
structure owners.	Ankazobe	spray teams and reminded them to mix insecticide in front of structure owners. Team leaders were reminded to monitor and ensure that this activity occurs.
Leaky spray pumps were observed	Tsihombe, Bekily, Anjozobe, Ambovombe	The leaky pumps were collected and either fixed by the spray pump mechanics, or spray operators were provided with a replacement spray pump.

5.6 POST-SPRAY ENVIRONMENTAL INSPECTION

Post-spray environmental inspections were conducted from December 21, 2013, to January 9, 2014, in the CHL and from March 17- April 5, 2014, in southern Madagascar. The AIRS Madagascar COP and Operations Manager completed the post-spray environmental inspection in the CHL with the four district coordinators. In southern Madagascar, the Operations Manager, Operations Coordinator, and district coordinators completed the post-spray environmental compliance inspections.

The main objective of the inspection was to ensure that all soak pits and store rooms were properly closed and to record any environmental issues that need to be resolved before the next IRS campaigns.

Key findings from the post-spray environmental inspection include:

- All store rooms in the CHL and the south were found to be empty (as all PPE, insecticides, and IRS commodities had been moved to the central warehouses in Antananarivo and Ambovombe) and cleaned by the store keepers and district coordinators. AIRS Madagascar staff ensured the store rooms were locked and collected all stock cards and other inventory records for storage at the central warehouses.
- All soak pits were covered with a cement cover to prevent people from accessing the soak pit materials and disturbing the degradation of insecticide wastes in the soak pit. Figure 3 provides an example of the concrete covers that were built over the soak pits used during the 2013-2014 IRS campaign.

FIGURE 3: CEMENT SOAK PIT COVER IN AMBOSITRA DISTRICT

- In Bekily and Mandoto districts, the landowners who rented space to AIRS Madagascar for developing operation sites requested that AIRS Madagascar remove the soak pits that were built for the 2013-2014 IRS campaign, as both landowners reported that they wanted to build within the location of the former operation site. AIRS Madagascar agreed to move the soak pits. After consulting with the AIRS Environmental Compliance Manager, the district coordinators for Bekily and Mandoto worked with the Operations Manager and Operations Coordinator to carefully dig up the soak pit layer by layer and transport the contents of the soak pit to new locations that the landowners had helped find. After building the new soak pits and placing the contents of the old soak pit into the new soak pit, AIRS Madagascar staff covered the new soak pits with a cement cover.

5.7 IRS Campaign Waste Disposal

AIRS Madagascar sent 310kg of solid waste (collected from all operation sites in the CHL by December 30, 2013, and from all operation sites in southern Madagascar by April 10, 2014) including 47,921 empty carbamate and pyrethroid sachets and 27,321 face masks to the Adonis incinerator in Antananarivo for disposal. AIRS Madagascar completed an inspection of the Adonis incinerator on April 7, 2014, where it was noted the incinerator was able to reach and maintain 1300C. The incineration of the solid waste is scheduled to take place in May, with the AIRS Madagascar Operations Manager and Operations Coordinator observing the incineration. A certificate of incineration will be provided to AIRS Madagascar after the process is completed.

AIRS Madagascar is currently working to dispose of 1,401 damaged gloves, 137 worn-out boots, and various metal strainers and funnels. Per new AIRS project policies the items have been washed thoroughly and can be given to the spray operators or another charitable/public interest organization. Presently, AIRS Madagascar is meeting with organizations involved in urban trash pick-up and removal in Antananarivo, and working to provide the damaged boots and other items to some of these organizations for their use.

AIRS Madagascar is currently working with Miharisoa Associates, an environmental engineering firm to recycle the 31,440 empty organophosphate bottles left-over from spraying southern Madagascar. The organophosphate bottles were cleaned by AIRS Madagascar staff after the IRS campaign in southern Madagascar ended, and delivered to Miharisoa Associates on April 25, 2014. Miharisoa Associates is currently breaking down the empty organophosphate bottles and will work with local manufacturing firms to use the recycled organophosphate bottles for producing paving stones, and material for road repair and construction. The Operations Manager and one of the district coordinators are currently following up with Miharisoa to gain updates on the recycling process.

5.7.1 Expired Fendona

Following the 2012-2013 IRS campaign, 361 expired sachets of Fendona remained in stock. Avima, the manufacturer that originally provided the Fendona to RTI, agreed to dispose of the expired Fendona for AIRS Madagascar. In early November 2013, AIRS Madagascar provided the 361 sachets to Societe Prochimad (Avima's distributor in Madagascar), which regularly disposes of expired Avima products.

6. Monitoring and Evaluation of 2012-2013 IRS Campaigns

M&E for the 2013-2014 IRS campaigns closely followed the processes outlined in the 2013-2014 AIRS Madagascar work plan. M&E activities were led by the AIRS Madagascar M&E Manager and the Database Manager.

6.1 Data Management

Spray operators entered IRS campaign data on their spray form at each eligible structure visited. This included noting if an eligible structure was sprayed or not sprayed, including the reason why the structure was not sprayed. The spray operators noted the number of people who sleep in the eligible structure regardless of whether the structures were sprayed or not sprayed. The spray operators also noted the number of pregnant women and the number of children under five years of age sleeping in the eligible structure.

Data quality assurance protocols were followed to check the accuracy of all spray operator data collected. Team leaders and thereafter sector and district coordinators were required to check and validate all spray forms before they were sent to the data entry center (four in the CHL, and six in southern Madagascar). Furthermore, the M&E Manager, the Database Manager, and the M&E assistants regularly made supervisory visits to the field to ensure that spray operators were accurately and correctly filling in their spray forms. Additionally, the M&E Manager, the Database Manager, and the M&E assistant regularly checked the accuracy of data entered by data clerks. This was mainly completed via the M&E Manager and Database Manager traveling to all of the data entry sites to supervise data entry, and noting any issues with the database.

During the supervision process, spray operator forms were randomly pulled and checked to ensure that the data noted on the spray operator forms matched what was entered in the database. The AIRS Madagascar database also included various logic and controls checks to ensure accurate data entry. For example, the database automatically prevented a data clerk from entering a sprayed structure that included a pregnant woman, if the data clerk had already entered that no women lived in the sprayed structure.

6.2 Number of Eligible Structures Sprayed

As noted in Table 15, the 2013-2014 IRS Campaign sprayed 343,470 eligible structures (82,091 eligible structures in the CHL and 261,379 eligible structures in southern Madagascar). Total spray coverage was recorded as 98.8 percent. It should be noted that the spray coverage does not include 40,867 structures in the insecure areas in the CHL and the southern areas AIRS Madagascar could not access.

TABLE 15: SUMMARY OF IRS COVERAGE

Spray Area	District	Total Number of Eligible Structures Found by Spray Operators	Total Number of Eligible Structures Sprayed by Spray Operators	Percentage of Eligible Structures Found that Were Sprayed (Spray Coverage)
CHL	Ambatofinandrahana	7,060	7,020	99.43%
	Ambohimahasoa	10,046	9,907	98.62%
	Ambositra	9,624	9,080	94.35%
	Anjozorobe	6,571	6,419	97.69%
	Ankazobe	19,944	19,394	97.24%
	Betafo	11,278	11,056	98.03%
	Mandoto	19,374	19,215	99.18%
	TOTAL	**83,897**	**82,091**	**97.85%**
SOUTH	Amboasary	1,904	1,829	96.06%
	Ambovombe	67,472	66,709	98.87%
	Ampanihy	61,547	61,288	99.58%
	Bekily	40,712	39,800	97.76%
	Beloha	25,489	25,397	99.64%
	Betroka	38,412	38,230	99.53%
	Tsihombe	28,343	28,126	99.23%
	TOTAL	**263,879**	**261,379**	**99.05%**
GRAND TOTAL		**347,776**	**343,470**	**98.76%**

Overall, 4,306 structures (1,806 structures in the CHL and 2,500 structures in the south) or 1.2 percent of structures that were identified as eligible were not sprayed during the IRS campaigns. This is a decrease from the 2012-2013 IRS campaign, when 8,683 structures or 2.3 percent of eligible structures were not sprayed.

The leading reasons why eligible structures were not sprayed during the 2013-2014 IRS campaign include:

- Residents of the eligible structures were not at home and left their structures locked while working in their fields, completing other work, or attending a nearby market. Unfortunately, the structures remained inaccessible during mop-up campaign efforts.
    - AIRS Madagascar has noted that in some of these areas where more locked structures were found, the door-to-door mobilization occurred two weeks before the IRS campaign, and many residents most likely forgot about or were less aware of the IRS campaign schedule. This may also mean that the other IEC activities, radio and IRS posters may have been less effective in backing-up the information provided during door-to-door mobilization, and AIRS Madagascar may need to explore other IEC activities, such as hiring "town criers", or

assuring community leaders meet with community members right before the IRS campaign, to assure messaging about the IRS campaign remains fresh and clear for residents.

- Residents were not at home due to funerals and other community-wide festivals/events.
- Higher refusal rates occurred in more urban areas, particularly in Ambositra district. In these areas, potential beneficiaries did not want to receive IRS due to:
    - Unwillingness to show belongings and personal items in front of neighbors;
    - Fear of theft of items, while beneficiaries waited two hours outside of their structure; and
    - Discomfort with allowing spray operators (strangers) into their structure to view their belongings.

6.3 POPULATION PROTECTED

A total of 1,588,138 people were protected during the IRS campaigns in the CHL (481,301) and the south (1,106,837). The population protected included 296,395 children under five years and 64,792 pregnant women. Table 16 notes the number of people protected during the IRS campaigns and is broken down by spray area and district.

TABLE 16: POPULATION PROTECTED

Spray Area	District	Total Population Protected	Pregnant Women Protected	Children under 5 years Protected
CHL	Ambatofinandrahana	45,713	1,049	7,309
	Ambohimahasoa	63,388	1,003	10,128
	Ambositra	55,607	1,311	8,372
	Anjozorobe	34,368	532	4,550
	Ankazobe	105,517	2,050	15,847
	Betafo	67,265	1,951	9,164
	Mandoto	109,443	3,037	16,663
	TOTAL	**481,301**	**10,933**	**72,033**
SOUTH	Amboasary	8,617	307	1,787
	Ambovombe	310,380	17,407	62,511
	Ampanihy	257,761	13,475	55,609
	Bekily	164,657	7,989	31,745
	Beloha	93,320	4,420	17,915
	Betroka	160,580	6,633	32,958
	Tsihombe	111,522	3,628	21,837
	TOTAL	**1,106,837**	**53,859**	**224,362**
GRAND TOTAL		**1,588,138**	**64,792**	**296,395**

6.4 USE OF INSECTICIDE AND SPRAY OPERATOR PERFORMANCE

In total, AIRS Madagascar used 79,594 bottles and sachets of insecticide for the 2013-2014 spray round. A total of 47,921 insecticide sachets (33,490 sachets of carbamate and 14,431 sachets of pyrethroids)

were used to spray 82,091 eligible structures in the CHLs. In southern Madagascar the spray operators used 31,673 bottles of organophosphates to spray 261,379 structures. Spray operators averaged spraying 11.7 structures per day in the CHL and 24.9 structures in the south. The average number of structures sprayed daily in the south is higher than the CHL due to the smaller size of structures in the region. Additionally, the smaller size of the structures in southern Madagascar accounted for the larger amount of structures sprayed per sachet/bottles. Spray operators were able to spray 8.25 structures per one bottle of organophosphate in southern Madagascar, whereas spray operators sprayed 1.71 structures per sachet of carbamate/pyrethroid in the CHL[6].

Table 17 provides a breakdown of the average number of structures covered by one sachet, per district.

TABLE 17: INSECTICIDE USED BY DISTRICT AND SPRAYER PERFORMANCE IN CHL AND SOUTH

Spray Area	Districts	Total Number of Eligible Structures Sprayed by Spray Operators	Bags/Bottles returned empty	Number of Structures Sprayed per Sachet/Bottles
CHL	Ambatofinandrahana	7,020	4,304	1.63
	Ambohimahasoa (Pyrethroid)	9,907	8,967	1.10
	Ambositra (Pyrethroid)	9,080	5,464	1.66
	Anjozorobe	6,419	2,945	2.18
	Ankazobe	19,394	11,590	1.67
	Betafo	11,056	5,330	2.07
	Mandoto	19,215	9,321	2.06
	TOTAL	**82,091**	**47,921**	**1.71**
SOUTH	Amboasary	1,829	233	7.80
	Ambovombe	66,709	7,358	9.07
	Ampanihy	61,288	6,204	9.88
	Bekily	39,800	5,198	7.66
	Beloha	25,397	2,488	10.21
	Betroka	38,230	7,168	5.33
	Tsihombe	28,126	3,024	9.30
	TOTAL	**261,379**	**31,673**	**8.25**
GRAND TOTAL		**343,470**	**79,594**	**4.32**

[6] All insecticide used by AIRS Madagascar during the 2013-2014 IRS campaign was formulated for one sachet of pyrethroids or carbamates, or one bottle of organophosphate to cover 250m2.

6.5 DATA QUALITY ASSURANCE

Data quality assurance activities were instituted for both data collection and data entry verification through newly developed AIRS project supervisory tools and the standard database audit check. AIRS found that these forms helped formalize self-audits of the IRS campaign's data to ensure better data quality and reduce the number of errors found on Daily Spray Operator Forms and in the M&E database. Compared to last year, it took DECs significantly less time to enter and clean data. Last year, DECs spent over 45 days cleaning data, as compared to this year when DECs spend 30 days cleaning data.

Table 18 indicates the number of forms used for each data quality assurance tool and the percentage of forms checked.

TABLE 18: NUMBER OF SUPERVISORY TOOLS USED

M&E supervisory tools	Number of forms used	Percent verified
Error Eliminators	4,831	10.27% of spray forms (47,000 spray forms printed for the CHL and South)
Data Collection Verification	1,413 (19,486 structures)	5.7% of structures found
Data Entry Verification	912 (13,680 lines of data)	3.98% of structures found

Error Eliminator

AIRS technical staff, supervisors, team leaders, and M&E Assistants used the Error Eliminator Form on a daily basis to detect and correct common errors on mobilizer and spray operator forms before they were transported to the data center. Common errors included arithmetic mistakes.

Data Collection Verification Form

AIRS M&E Assistants, technical staff, and supervisors used the Data Collection Verification (DCV) tool to interview households to verify spray coverage data. Staff visited and interviewed residents from 19,486 structures (5.7%) during the campaign. Common data collection inconsistencies were primarily due to a variance in the population-protected count. M&E Assistants did find one instance where Spray operators were making up data using this form in Betafo; M&E Assistants alerted the Spray operators, the District Coordinator, and the sector coordinator, and the spray forms were fixed. Staff performed these verification visits within approximately two days of spray and identified errors in enough time to correct mistakes and notify spray operators and team leaders to prevent repeated errors.

Data Entry Verification Form

The M&E Assistants and M&E and Database Managers used the Data Entry Verification tool to verify that the data entered into the database matched the data on the Daily Spray Operator Forms in conjunction with the database cleaner. Significantly fewer errors were found this year compared to last year, as a result of the in-field supervisory verification tools (i.e., Error Eliminator and DCV tools) and the new database data cleaner that was programmed and installed before the campaign began.

At the end of every week, the M&E Assistants would meet with the district coordinators to discuss the spray progress and the errors found using the data quality assurance tools. Furthermore, the AIRS Madagascar M&E Manager and Database Manager provided feedback regarding errors found on spray operator cards, and gave recommendations to the AIRS Madagascar Operations Manager, commune coordinators, and spray team leaders, in order to minimize future data errors on the spray operator cards.

7. ENTOMOLOGY

Under the supervision of the AIRS Madagascar Technical Director, the project's four entomological surveillance teams (each consisting of an entomologist and two entomological assistants) completed all entomological surveillance activities. Since AIRS Madagascar is currently finishing its entomological surveillance work, and will send-in a final entomological report in June, this section provides a brief summary of some of the entomological surveillance results regarding the 2013-2014 IRS campaign.

7.1 ENTOMOLOGICAL SURVEILLANCE SENTINEL SITES

In June 2013, AIRS Madagascar and PMI Madagascar met with the RBM committee and selected sentinel sites for completing entomological surveillance during the 2013-2014 IRS campaign. It was decided that all AIRS Madagascar sentinel sites would be located in the districts supported by PMI-Madagascar for the 2013-2014 IRS campaign. This meant that some sentinel sites used during the 2012-2013 IRS campaign and located in non-PMI supported districts were not used in 2013-2014.

Inanantonana and Ambatofinandrahana were selected as control sentinel sites. Both sentinel sites are located in districts that were sprayed during the 2012-2013 IRS campaign, however, both sentinel sites are located in communes that were not sprayed under the focalized spraying system in the CHL.

Table 19 lists all of the sentinel sites where entomological surveillance was carried out during the 2013-2014 IRS campaign.

TABLE 19: ENTOMOLOGICAL SURVEILLANCE SITES FOR 2013-2014 IRS CAMPAIGN

Community	District	Spray Area	Notes
Inanantonana	Betafo	CHL	No spraying at this site, used as a control
Ambatofinandrahana	Ambatofinandrahana	CHL	No spraying at this site, used as a control
Imerina Imady	Ambositra	CHL	New sentinel site in pyrethroid-spray area
Manandroy	Ambohimahasoa	CHL	New sentinel site in pyrethroid-spray area
Soavina	Betafo	CHL	Sentinel site in carbamate-spray area
Soavina	Ambatofinandrahana	CHL	Sentinel site in carbamate-spray area
Kiangara	Ankazobe	CHL	Sentinel site in carbamate-spray area
Behara Ambovombe	Amboasary	Southern Madagascar	Sentinel site in organophosphate-spray area. Used only during baseline. Work stopped at sentinel site due to insecurity in the district.
Ambovombe	Ambovombe	Southern Madagascar	Replaced Amboasary sentinel site after AIRS Madagascar stopped work in the district due to insecurity.
Ejeda	Ampanihy	Southern Madagascar	New sentinel site in organophosphate-spray area
Bekily	Bekily	Southern Madagascar	New sentinel site in organophosphate-spray area

7.2 Entomological Surveillance Baseline

Baseline entomological data was collected one month before the start of the IRS campaign in both spray areas (October 2013 in the CHL, and December 2013 in southern Madagascar). In both areas, baseline data noted that *Anopheles gambiae s.l* is the most prevalent vector species.

In the CHL, *Anopheles gambiae s.l* ranged from 37 percent in Kiangara to 1.4 percent in Imerina Imady. *Anopheles mascarensis* was the second most prevalent vector species in the CHL ranging from 8 percent in Kiangara, and less than 1 percent or not found at all other sentinel sites.

In the south, *Anopheles gambiae s.l* ranged from 16.3 percent of the mosquitoes species found in Bekily to 13.8 percent in Ejeda. Unlike the CHL, very small numbers of other vector/Anopheline species were found in the south, comprising less than 1 percent of the mosquitoes collected at each sentinel site. Other non-Anopheline species accounted for more than 75 percent of the other mosquitoes collected in the south, which was considerably higher than in the CHL.

7.3 Initial Bioassay Test Results

AIRS Madagascar completed monthly bioassays, via the WHO cone bioassay method, to test the residual efficacy of insecticides sprayed during the 2013-2014 IRS campaign at the Betafo, Kiangara, and Imerina Imady sentinel sites in the CHL and at the Ambovombe and Ejeda sentinel sites in southern Madagascar. Since Madagascar lacks a susceptible colony of Kisumu strain mosquitoes, all bioassay tests were completed with local wild mosquitoes that were caught near the sentinel sites and raised from larvae to adults. During the bioassay tests, the knock-down rate for mosquitoes was noted after 30 minutes and 60 minutes. Bendiocarb was tested at Kiangara and Soavina/Betafo sentinel sites, pyrethroids were tested at Imerina Imady sentinel site, and organophosphate was tested at the Ambovombe sentinel site.

During the first week of the IRS campaigns in the central highlands and southern Madagascar, AIRS Madagascar completed wall bioassays tests to assure the initial quality of spraying was sufficient. AIRS Madagascar found the quality of spraying in CHL to be good with test mortality rates of 100 percent for all structures observed.

However, in southern Madagascar, the entomology team noted that two structures observed at the sentinel site were noted for poor quality of spraying. Given that organophosphate when sprayed on the walls leaves a visible streak, AIRS Madagascar staff was quick to note irregular spray patterns at the two structures, and non-uniform application of insecticide on the walls. AIRS Madagascar identified the spray operators and spray team leaders who covered these structures and provided remedial training in spray technique. Additionally, the district coordinator and sector coordinator were alerted to this issue and reminded to monitor spraying closely, and asked spray operators to re-spray structures if initial spraying was not done correctly. This explains why the residual efficacy was noted at 78.6 percent during the first bioassay in southern Madagascar. During subsequent bioassays, the two structures with poor spray coverage were no longer used and, instead, replaced by two new structures (please see Figure 6.)

Figures 4, 5, and 6 below note the current results for cone bioassays as of the submission of this report

FIGURE 4: RESIDUAL EFFICACY OBSERVED FOR BENDIOCARB IN THE CHL

(Please note bioassays ended in March for Kiangara as residual efficacy had dropped below 70 percent at the sentinel site).

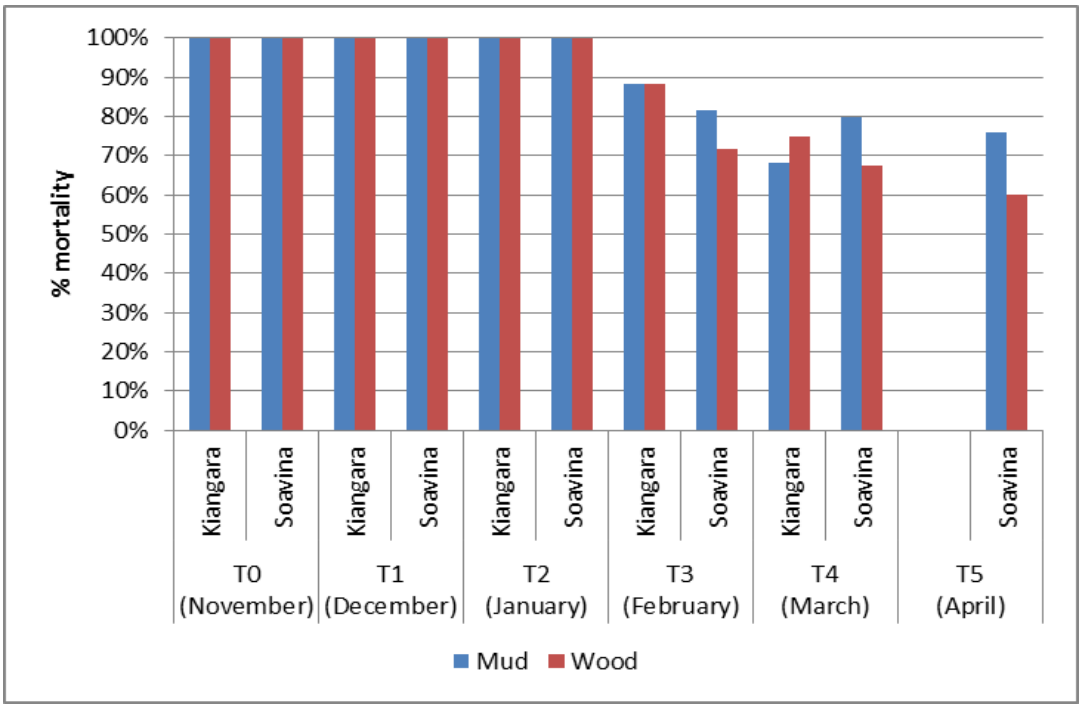


FIGURE 5: RESIDUAL EFFCACY RATE OBSERVED FOR PYRETHROIDS IN THE CHL

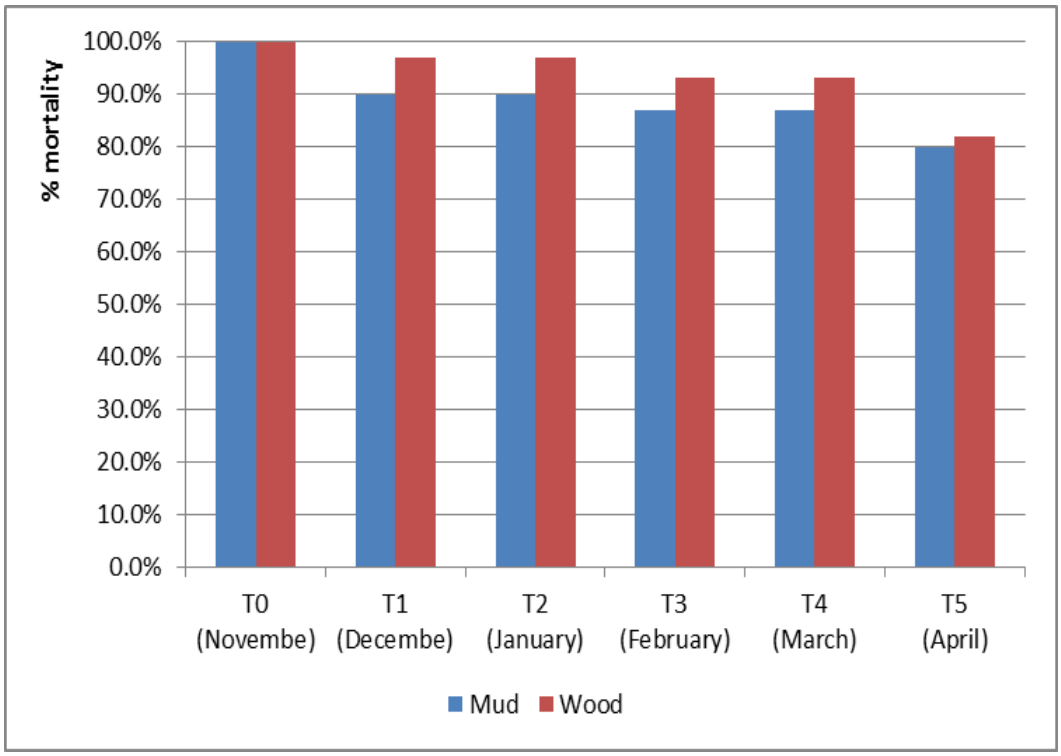
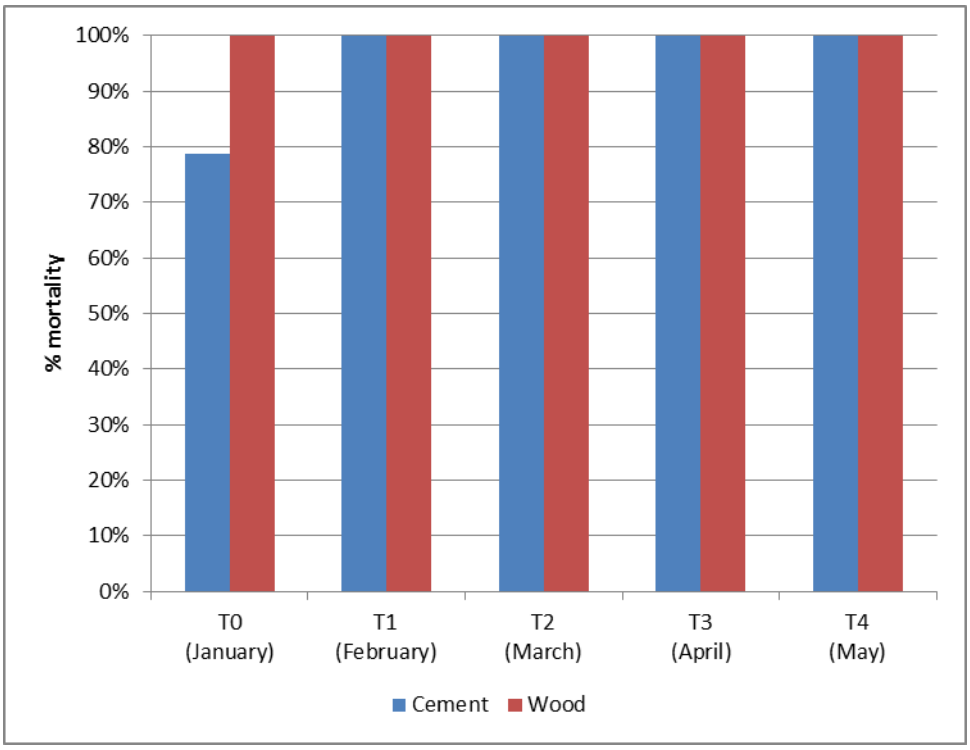


FIGURE 6: RESIDUAL EFFICACY OBSERVED FOR ORGANOPHOSPHATES IN SOUTHERN MADAGASCAR



7.4 INSECTICIDE SUSCEPTIBILITY TESTING

Susceptibility testing for the 2013-2014 IRS campaign was completed via two methods: WHO tube tests and Centers for Disease Control (CDC) bottle assays. For both methods, two- to four-day old, non-blood-fed adult female mosquitoes reared from field-collected larvae and pupae were exposed to diagnostic concentrations of the insecticide classes approved by the WHO for IRS for a recommended time of exposure. The knock-down (KD) rate was observed every 15 minutes for one hour for CDC bottle bioassay. With WHO tube tests, KD rate was observed at 10, 15, 20, 40, and 60 minutes, and the mortality rate was observed after 24 hours.

The WHO criteria for interpreting susceptibility testing were used during the analysis of the susceptibility test data. These criteria notes:

- Susceptibility = Mortality rate of the exposed vector greater than 98 percent;
- Possible Resistance = Mortality rate of the exposed vector is between 90 and 97percent;
- Resistance = Mortality rate of the exposed vector is less than 90 percent.

Based on the insecticide susceptibility data collected following the 2013-2014 IRS campaign, three of the four insecticide classes (except for organochlorides) approved by the WHO for IRS are potentially eligible for selection and use in Madagascar. Full susceptibility was noted for Deltamethrin, Bendiocarb, and Pirimiphos-Methyl. Possible resistance was noted for Lambdacyhalothrin, Alpha-Cypermethrin, and DDT.

Figures 7 and 8 provide the results of susceptibility tests completed via WHO tube bioassay and CDC bottle bioassay.

FIGURE 7: INSECTICIDE SUSCEPTIBILITY TEST RESULTS VIA WHO BIOASSAY FOR *ANOPHELES GAMBIAE S.L.*

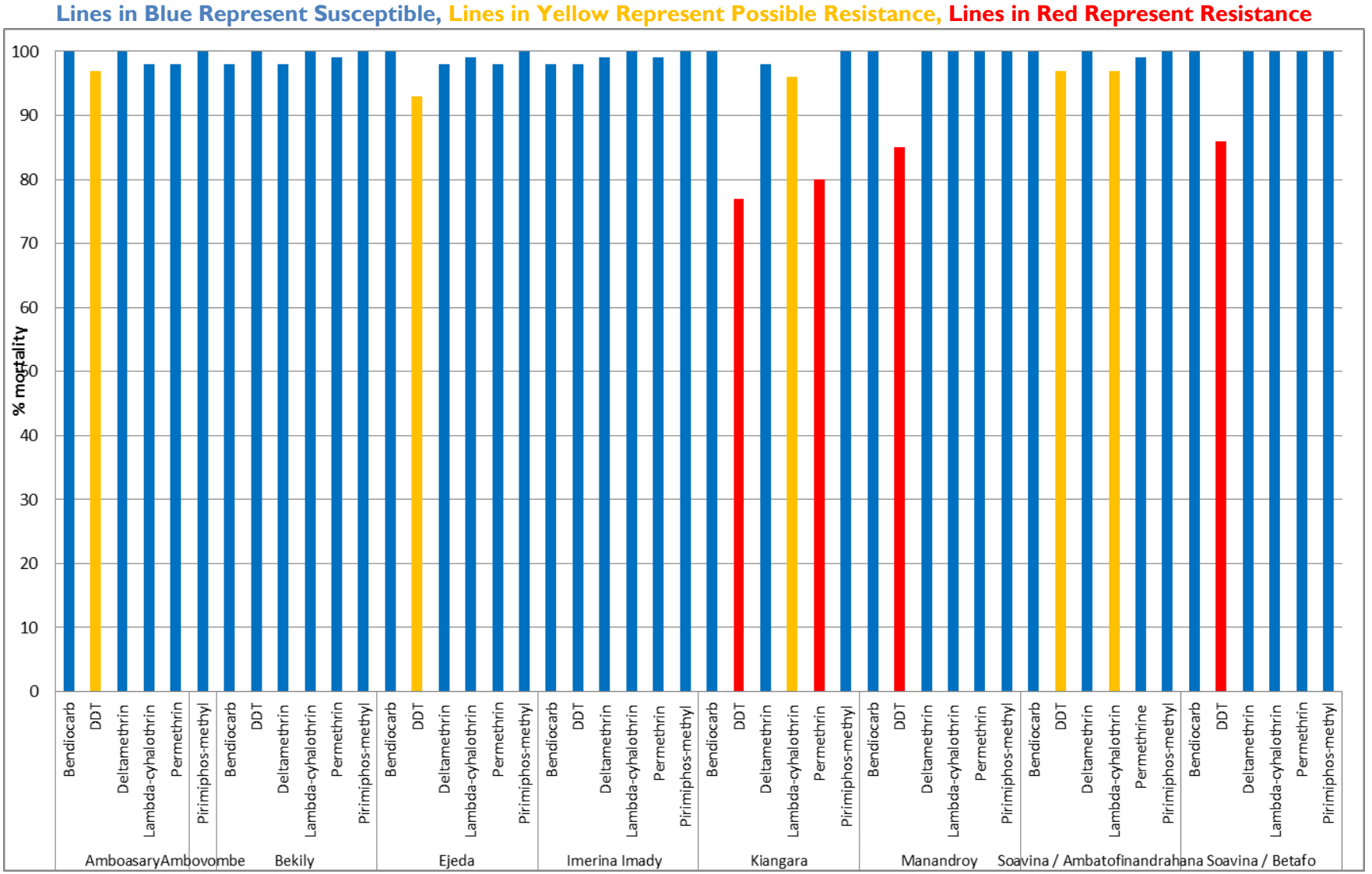
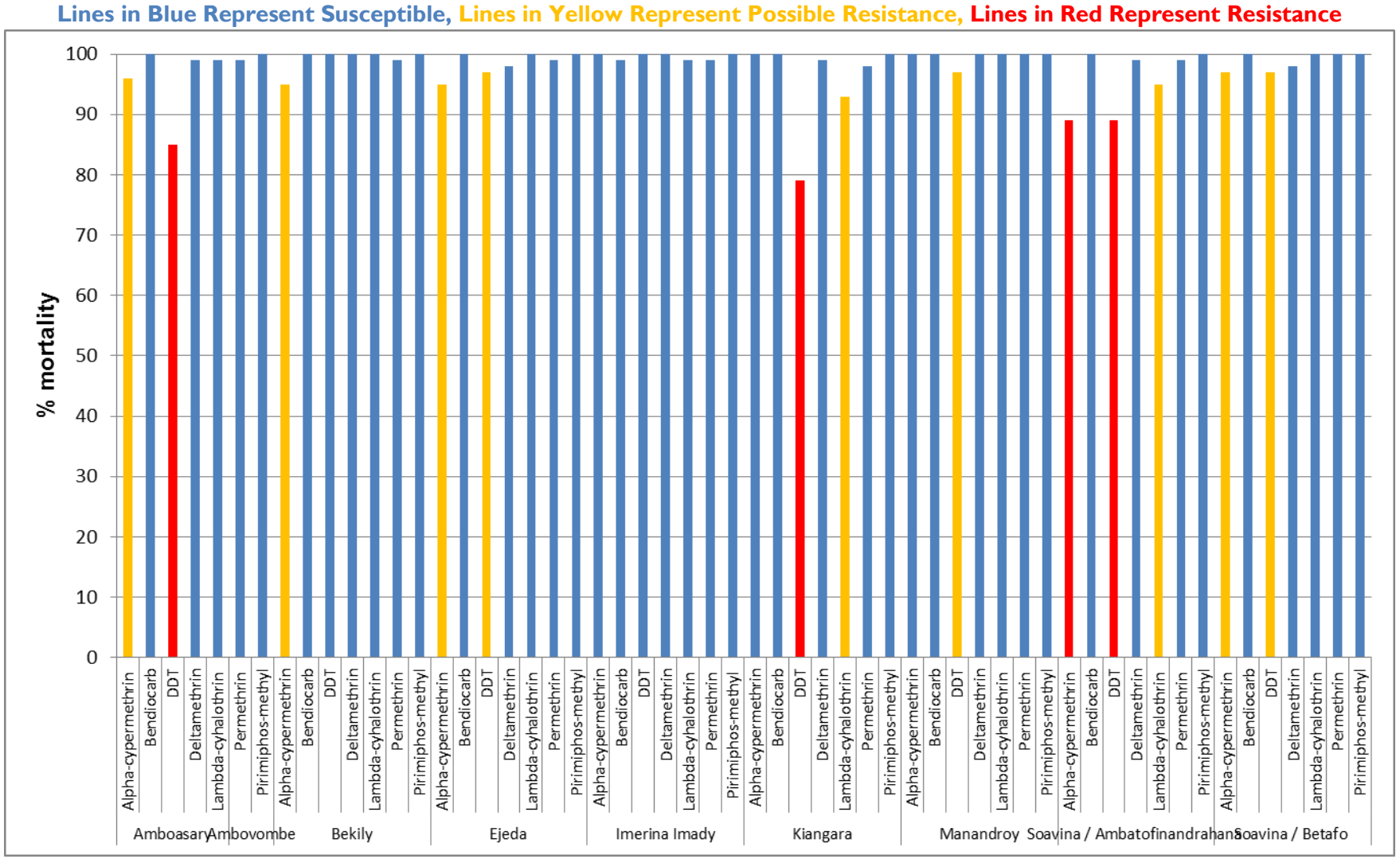


FIGURE 8: INSECTICIDE SUSCEPTIBILITY TEST RESULTS VIA CDC BIOASSAY FOR *ANOPHELES GAMBIAE S.L.*



7.5 OTHER ENTOMOLOGICAL SURVEILLANCE FINDINGS

- Indoor man-biting rates indoors in most spray areas reduced significantly from baseline through several months after the IRS campaign.
    - In the pyrethroid spray area in the CHL, man-biting rates were noted at Imerina Imady sentinel site as 1.47 indoors before the IRS campaign, and 0.6 indoors four months after spraying; at Manandroy sentinel site, man-biting rates were noted as 0.17 before spraying and decreased to zero, 4 months after spraying.
    - In the carbamate spray area in the CHL, man-biting rates indoors at baseline were noted as 1.3 in Kiangara; 1.33 in Soavina-Betafo; and 4 in Soavina-Ambatofinandrahana. Man-biting rates indoors decreased to 0.5 in Kiangara four months after spraying; zero in Soavina-Betafo four months after spraying, and 1.3 in Soavina-Ambatofinandrahana three months after spraying.
    - For organophosphate, in southern Madagascar, man-biting rates indoors were noted as 2.7 in Bekily and 1.4 in Ejeda before the IRS campaign. Man-biting rates decreased to 0.75 in Bekily, and to 1.17 in Ejeda, two months after spraying.
- Vectors were noted as exophagic, biting more outside than inside. It is possible that the high coverage of LLINs following three years of intensive distribution may have contributed to the outdoor biting tendency in some areas such as Kiangara, Soavina Betafo, Inanantonana, Soavina Ambatofinandrahana, and Ambatofinandrahana. The exophagic rate is more prevalent after spraying even in the sites without LLINs. (See table 20 below).

TABLE 20: EXOPHAGIC RATE (PERCENT OBSERVED)

Spray Area	Site	October	November	December	January	February	March	April
CHL	Kiangara	55.54	55.5	80	76.47	63.64	80	75
	Soavina-Betafo	46.6	23.52	57.14	15.38	0	0	0
	Manandroy	66	100	83.8	50	85.7	100	0
	Imerina Imady	100	35	50	100	100	37.5	0
	Soavina-Ambato-finandra-hana	50	60	54.2	100	68	78	81
	Inanantonana (control)	62	17,64	50	75	25	18.18	20
	Ambato-finan-drahana (control)	100	0	50	66.7	100	40	57
Southern Madagascar	Bekily			66.6	0	75.55	83.33	72
	Ejeda			0	54.5	70	56.9	60

- Vector density was low, but especially low in areas covered by IRS. In these areas, the indoor resting density (via pyrethrum spray collections) was zero or close to zero following spraying.

TABLE 21: INDOOR RESTING DENSITY (VIA PYRETHRUM SPRAY COLLECTION)

Spray Area	Site	October	November	December	January	February	March	April
CHL	Kiangara	0.5	0.5	0.5	0.5	0.5	0.5	0
	Soavina-Betafo	0	0	0	0	0	0	0
	Manandroy	0	0	0	0	0	0	0
	Imerina Imady	0	0	0	0	0	0	0
	Soavina-Ambato-finandra-hana	0	0	0	0	0	0	0
	Inanantonana (control)	0.1	0.1	0.1	0.1	0.1	0.1	0
	Ambato-finan-drahana (control)	0	0	0	0	0	0	0
Southern Madagascar	Bekily			0.1	0	0	0	0
	Ejeda			0	0.2	0	0	0

8. Post-spray Activities

8.1 Close-Out of IRS Campaigns and Transport of IRS Commodities back to Central Warehouses

Following the end of the IRS campaign, the spray operators, washers, team leaders, spray pump technicians, couriers, and district coordinators returned all PPE, insecticide sachets/bottles (used and unused), and other IRS commodities to their assigned store rooms. All returned items were inspected (especially PPE to ensure it was cleaned) and noted on the store rooms' final stock cards as the stock card's final entry. Thereafter, the district coordinators, AIRS Madagascar logistics manager, and the seasonal staff logistics assistant traveled to all store rooms with trucks, collected all PPE, insecticide, and other IRS commodities, and returned these items to the central warehouses in Antananarivo and Ambovombe. This activity took place in the CHL from December 22-31, 2013, and in the south from March 12-26, 2014.

Following the return of all PPE and insecticide to central warehouses, the logistics manager made a final count of all insecticide and PPE remaining after the IRS campaign, and noted various IRS equipment that was damaged and in need of repair, or that was beyond repair and will need to be discarded. A list of the IRS campaign equipment and insecticide counted and reviewed after the IRS campaign is found in the annex.

8.2 Presentation of IRS Campaign Results

During post-IRS campaign activities (late-December to mid-January in the CHL; late March to early April in southern Madagascar)AIRS Madagascar staff met with Chef de Districts, Chef de Fokontanys, Mayors, and Chef de CSB in the districts covered by the IRS campaign in the south. During the meetings, AIRS Madagascar staff presented the initial results of the IRS campaign and thanked the officials for their assistance with communicating the dates of the IRS campaign to beneficiaries within their districts, providing information to the AIRS Madagascar team about insecurity and assisting with other IRS activities. The AIRS Madagascar Chief of Party also shared the results of the IRS campaign at the PMI partner meeting on April 30, 2014. AIRS Madagascar also plans to translate the final version of this End of Spray Report into French, and provide the report to the NMCP.

9. LESSONS LEARNED

Staffing During IRS Campaign

- The current staffing level and organization of staff is well-positioned to plan for and provide thorough supervision in two different geographic areas concurrently. The AIRS Operations Coordinator proved to be a very useful position, as this allowed for AIRS to complete concurrent set-up of IRS campaigns in two different regions of Madagascar, and extended AIRS' ability to manage and supervise the IRS campaigns.
- Having a smaller number of spray operators has allowed for better organization and management of spraying logistics. Additionally, since these spray operators have a breakfast, are transported by car and worked throughout the entire IRS campaign, they continued to gain experience, improve their skills, and were less likely to make errors.
- Additionally, M&E assistants in each district were a great help in assuring all spray campaign data was sent-in from each operation site daily. In some areas M&E assistants acted as couriers, driving in data from operation sites to the data entry centers. The M&E assistants also added extra staff to visit structures and talk to beneficiaries in the spray areas, and to complete data audits to assure the data collected by the spray operators and entered in the database was correct.

Logistics and Infrastructure

- AIRS Madagascar has 40,458 bottles of organophosphate, 34,145 sachets of carbamates, and 4,468 sachets of pyrethroids in stock after the 2013-2014 IRS campaign. AIRS Madagascar overestimated the amount of insecticide needed for the past IRS campaigns. With the excess insecticide in stock AIRS Madagascar will lower the insecticide procurement costs compared to previous years. Furthermore, with two years of forecasting and usage data, AIRS Madagascar should be able to improve the accuracy of its forecasting for spraying in the CHL. It's also key to note that the bottles of organophosphate in stock will be tested to extend their expiration dates past October/November 2014.
- The pilot usage of mobile soak pits was a success and allowed AIRS Madagascar to assure environmental compliance when spray teams rinsed spray pumps and washed PPE in remote locations. The mobile soak pit saved AIRS Madagascar considerable costs and time compared to building small soak pits in hard-to-reach areas that would be used for a short-period of time.

Insecurity and Relationship with NMCP and Local Authorities

- Insecurity in Madagascar (including parts of the CHL), remains a significant threat to implementation of IRS programming in Madagascar. AIRS Madagascar's staff have built good relationships with the NMCP and local authorities, and was able to work with them to make decisions regarding the safety and security of IRS campaign staff, such as pulling-out of Amboasary district.

10. RECOMMENDATIONS

- AIRS Madagascar should hire an IEC coordinator as a seasonal staff member during the 2014 IRS campaign. This person could help better organize IEC activities, particularly door-to-door mobilization, given that other AIRS Madagascar staff is too busy with IRS campaign preparations to properly supervise IEC activities. Additionally, this seasonal staff member could help improve IEC messaging in Madagascar to better emphasize the importance of IRS as a malaria control activity, and how IRS is complementary to using LLINs to farther reduce malaria.
- While the mobile banking system proved to be a good innovation that helped lessen costs and risks associated with paying seasonal staff, better coordination, organization, and communication are needed to improve the system for future IRS campaigns. Most notably, AIRS Madagascar needs to employ regular communications with seasonal staff to make certain they are aware of when pay dates will occur, and provide updates in case seasonal staff payments may be late.
- When spraying new districts during future IRS campaigns, AIRS Madagascar should look into using only mobile soak pits versus building new soak pits. This initiative may have a smaller footprint on the environment.
- Given that the number of seasonal staff has decreased, AIRS Madagascar needs to complete a thorough inventory of all PPE in stock to determine what equipment is in good condition and which PPE items should be disposed of or recycled, and needs to be replaced. AIRS staff on STTA noted that AIRS Madagascar has considerable numbers of broken spray pumps taking up space in store rooms and warehouses.
- AIRS Madagascar also should review the condition of its motorcycles and determine which motorcycles can continue to be used during future IRS campaigns, and which motorcycles need to be replaced. The motorcycles go through extreme wear and tear each spray season, and it may be cheaper to buy a new motorcycle than continually complete extensive repairs after each spray campaign for some of the motorcycles.
- AIRS Madagascar should consider holding driver safety training as part of its pre-spray training. The training, which is conducted in other AIRS countries, can review how all vehicles should properly store and transport insecticide, and provide safety guidelines that should be followed during the IRS campaign. The training could highlight to drivers the need to always use caution while working during the IRS campaign and avoid putting their vehicle, the seasonal staff in the vehicle, and the PPE/insecticide in the vehicle into risky situations.
- The AIRS project should consider new ways to improve the efficiency of stock management. Current practices are effective, however, simple improvements such as using barcodes and scanners for IRS commodities at all storage levels (central warehouses to operation site store rooms) could further improve the tracking of insecticide and PPE, and ensure inventory records are kept up-to-date and accurate. AIRS project staff should look into using AIRS smart phone applications for improving stock management record-keeping.
- Given the decrease in the percentage of women seasonal staff due to less women applying for seasonal staff positions during the 2013-2014 IRS campaign (as compared to the 2012-2013 IRS campaign), AIRS Madagascar should work to increase its outreach to possible women seasonal staff candidates. This can include during 2014 IRS campaign planning meetings with community and district leaders, AIRS Madagascar staff should emphasize the need to hire more women

seasonal staff; and ask community and district leaders to nominate more women candidates. During these meeting AIRS Madagascar should also promote how other AIRS countries have increased the number of women in IRS programming, and provide IEC materials, including success stories, and videos that AIRS has developed regarding g women in IRS. Further, AIRS Madagascar can have several of its own women staff including entomologists and district coordinators explain their work and emphasize the importance of including more women as seasonal staff in Madagascar, and promote the idea that women should be have higher representation in all IRS campaign seasonal staff positions. AIRS Madagascar should make sure that any recruitment meetings are scheduled at times that are more convenient for women candidates, such as avoiding morning recruitment meetings when women may be less available due to various household and childcare activities. AIRS Madagascar staff should "network" with women that were employed during the 2013-2014 IRS campaign as seasonal staff, and find-out if they have are aware of other women that should be considered for hire during the 2014 IRS campaign.

11. ANNEX

11.1 ADDITIONAL TABLES AND FIGURES

TABLE 22: NUMBER OF PEOPLE TRAINED, DISAGGREGATED BY GENDER

CHL																				
Categories of Persons Trained	Training on IRS Delivery										Other Trainings									
	Training of Trainers: Spray Ops		Spray Operations		Data Entry		Logistics		Technical Maintenance		IEC Mobilization/ Enumeration		Private Health Training		PPE Washing		Security		Transportation	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Logistics Assistant	1	0																		
Financial Assistant	2	0																		
Environnemental Compliance Assistant	1																			
M&E Assistant					4	0														
Data Entry Clerk					9	7														
Sector Manager	20	0																		
Store Keeper							15	6												
Store Room Guard																	26	0		
Team Leader			50	6																
Spray Operator			275	6																
Washer															0	28				

IEC Mobilizer											172	128								
Carrier/Porter																			94	0
Spray Pump Technician									24	0										
Private Healh Staff													3	1						
TOTAL M/F	24	0	325	12	13	7	15	6	24	0	172	128	3	1	0	28	26	0	94	0
TOTAL/ training	24		337		20		21		24		300		4		28		26		94	
Grand TOTAL	**878**																			
Total Number of Women trained in the CHL	**182**																			
Total Number of men trained in the CHL	**696**																			

SOUTH

Categories of Persons Trained	Categories of Persons Trained										Categories of Persons Trained									
	Training of Trainers: Spray Ops		Spray Operations		Data Entry		Logistics		Technical Maintenance		IEC Mobilization/ Enumeration		Private Heath training		IEC TOT		PPE Washing		Security	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Logistics Assistant		0																		
Financial Assistant		1																		
M&E Assistant					7															
Data Entry Clerk					13	13														
Sector Manager	24	0																		
Store Keeper							10	10												
Store Room Guard																			38	0
Team Leader			65	6																
Spray Operator			329	26																

Washer																	0	46		
IEC Mobilizer											389	138								
IEC Supervisor															116	59				
Carrier/Porter																				
Spray Pump Technician									18	0										
Private Health staff													5	2						
TOTAL M/F	25		426		33		20		18		527		7		175		46		38	
TOTAL/ training	**1,363**																			
Grand TOTAL	**300**																			
Total Number of Women trained in the South	**1063**																			
Total Number of Women Trained in the South and CHL	482																			
Total Number of Men Trained in the South and CHL	1759																			
Grand Total Number of People Trained in South and CHL	2241																			

TABLE 23: INSECTICIDE AND PPE IN INVENTORY

Item	Stock at the Start of the IRS Campaign	Quantity Used During the IRS Campaign	Quantity Damaged/Theft	Quantity Usable for Next IRS Campaign
Apron	82	82	17	65
Barrel (100 Litre)Triple Rinse	223	223	0	223
Barrel (Water Storage)	64	64	0	64
Bucket (10 litre)	1452	1452	330	1122
Barrel 200 litre	214	214	6	208
Bucket (15 litre)	1563	1563	0	1563
Bucket 15l	1563	1563	63	1500
Dusk Mask with valve	52499	27321	0	25178
Extension Tube	1161	1161	179	982
Face Shield	1839	1839	1839	0
Face Shield Brackets	1798	1798	0	1798
First Aid Kit	234	134	0	100
Gloves - Long	84	84	0	84
Gloves -Short	2673	1877	1877	796
Gum Boots (pair)	1922	1922	69	1853
Haversack	847	773	773	74
Helmet	2538	2538	0	2538
Helmet Brackets	2538	2538	0	2538
Nozzle Body Cap	250	0	0	250
Nozzle Tip	6124	1056	1056	5068
Padlocks	290	290	62	228
Poly/Cotton Coverall	5225	5225	179	5009

Shovel	268	268	10	258
Socks	4680	3127	3127	1553
Spare Part Kit	6	0	0	6
Tarpaulin (Misc.)	845	845	523	322
Tarpaulin for Covering Furniture	845	845	332	513
Tarpaulin for Covering Soak Pits	50	50	32	18
Tarpaulin for Surrounding Bathing Areas	128	128	128	0
Tarpaulin large (100meter 2.8 meter/sheet)	2	1	0	1
Thermometer	60	60	0	60
Tool Kits	56	56	0	56
Towel	926	760	760	166

FIGURE 9: EXAMPLE OF IEC MOBILIZER LEAFLET USED DURING 2013-2014 IRS CAMPAIGN

11.2 MADAGASCAR MONITORING AND EVALUATION PLAN INDICATOR MATRIX

TABLE 24: MONITORING AND EVALUATION PLAN MATRIX

Updated: 13 May 2014

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[7]	Target[8]	Results	Target	Results
Component 1: Establish cost-effective supply chain mechanisms including procurement, distribution and storage of IRS-related commodities and execute all aspects of logistical plans for IRS-related activities.											
1.1 Procurement											
1.1.1 Number and percentage of international insecticide procurement orders delivered in country, at port of entry, at least 30 days prior to the start of spray operations	[*Numerator:* Number of international insecticide procurements delivered in country, at port of entry, at least 30 days prior to the start of spray operations] [*Denominator:* Total number of international insecticide procurements] *Calculation:* [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source*: Project records – ex: international procurement documents, air way bills, commercial invoices *Reporting frequency*: Each spray season (annual/ semi-annual)	By Spray Campaign	AIRS	N.A.; 80%	2; N/A%	2; 100%	2; 100%	2; 100%	
1.1.2 Number and percentage of international procurement orders for equipment, including PPE, received at port of	[*Numerator:* Number of international procurements for equipment, including PPE, at port of entry, 30 days prior to start of spray operations]	Y1, Y2, Y3	*Data source:* Project records *Reporting frequency*: Each spray season (annual/ semi-annual)	By Spray Campaign	AIRS	N.A.; 85%	02; 100%	1; 100%	1; 100%	1; 100%	

[7] Results for Year 1 will be added to the matrix after the completion of the 2012 End of Spray Report.
[8] Targets for Year 2 will be added to the matrix after the 2013 Workplan has been approved.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[7]	Target[8]	Results	Target	Results
entry, 30 days prior to start of spray operations.	[*Denominator*: *Total number of* international procurements for equipment, including PPE.*]* *Calculation:* [Numerator ÷ Denominator] x 100										
1.1.3 Number and percentage of local PPE procurement orders that are delivered to the main warehouse 14 days before the start of spray operations	[*[Numerator:* Number of local PPE procurements delivered 14 days before the start of spray operations] [*Denominator*: *Total number of local PPE procurements.]* *Calculation:* [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source:* Project records – ex: such as delivery notes, goods receiving notes, inventory control cards *Reporting frequency*: Each spray season (annual/ semi-annual)	By Spray Campaign	AIRS	N.A; 80%	01; 100%	1; 100%	1; 100%	1; 100%	
1.1.4 Successfully completed spray operations without an insecticide stock-out	Milestone: (Achieved/Not Achieved)	Y1, Y2, Y3	*Data source:* Project records – *ex:* inventory control cards *Reporting frequency*: Each spray season (annual/ semi-annual)	By Spray Campaign	AIRS	Achieved	Achieved	Achieved	Achieved	Achieved	

1.2 In-country Logistics, Warehousing, and Training											
1.2.1 Number and percentage of logistics, warehouse managers, and storekeepers trained in IRS supply chain management	*[Numerator:* Total number of logistics and warehouse managers trained in IRS supply chain management using AIRS Project resources.] *[Denominator:* Total number of AIRS logistics and warehouse managers.] *Calculation*: [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source*: Routine training records *Reporting frequency*: Semi-annually	By Spray Campaign By Gender	PMI	179 out of 179; 100%	145 out of 145; 100% M: 107 F:38	58 out of 58; 100%	41; 100% M: 25 F: 16	27	
1.2.2 Number and percentage of base stores where physical inventories are verified by up-to-date stock records	*[Numerator:* Number of base stores where physical inventories are verified by up-to-date stock records] [*Denominator*: *Total number of base stores audited.]* *Calculation:* [Numerator ÷ Denominator] x 100 *(See PIRS for details on sample size for operational audits)*	Y2, Y3	*Data source:* Project records - ex: inventroy control cards *Reporting frequency*: Each spray season (annual/ semi-annual)	By Spray Campaign	AIRS	N.A.	84 out of 145; 58%	58; 100%	41; 100%	27; 100%	
1.2.3 Submit up-to-date inventory records to AIRS Home Office 30 days after the end of each spray campaign	Milestone: (Completed/Not Completed)	Y2, Y3	*Data source:* Project records - ex: warehouse inventory control cards *Reporting frequency*: Each spray season (annual/ semi-annual)	By Spray Campaign	AIRS	Completed	Completed	Completed	Completed	Completed	

Component 2: Implement safe and high-quality IRS programs and provide operational management support											
2.1 Planning and Design of IRS Programs											
2.1.1 Annual IRS country work plan developed and submitted on time	Milestone: (Completed/Not Completed)	Y1, Y2, Y3	*Data source:* Project records *Reporting frequency*: Annually		AIRS	Completed	Completed	Completed	Completed	Completed	
2.2 Support of Safety and Health Best Practices and Compliance with USAID and Host Country Environmental Regulations											
2.2.1 SEA/letter report submitted on time[9]	Milestone: (Completed/Not Completed)	Y1, Y2, Y3	*Data source*: Project records – submitted SEAs/ letter reports *Reporting frequency:* Each spray campaign	By Spray Campaign	AIRS	Completed	Completed	Completed	Completed	Completed	
2.2.2 Number and percentage of soak pits and warehouses/storerooms inspected and certified by an environmental officer/AIRS Environmental Compliance Officer prior to spraying	*[*Numerator: Number of soak pits and/or storehouses inspected and certified by AIRS Environmental Compliance Office] *[*Denominator: Total number of project soak pits and/or storehouses] Calculation: *[Numerator ÷ Denominator] x 100*	Y1, Y2, Y3	*Data source:* Project records – Reports submitted by environmental officers *Reporting frequency:* Each spray season	By Spray Campaign By soakpits and warehouses/ storerooms	AIRS	N.A. 100% inspected and approved prior to spraying	Total: 359 WH: 125 out of 148 (84.46%) Soak Pit: 120 out of 159 (75.47%) Secondary Soak Pit: 114 out of 600 (19.00%)	100% WH: 58 out 58 Soak Pit 58 out 58 Mobile Soak Pit 45 out of 45	Total:148; 100% WH: 41 Soak Pit: 41 Mobile Soak Pit: 66	Total: 105; 100% WH: 27 Soak Pit: 27 Mobile Soak Pit: 51	

[9] In Year 1, SEAs were due 30 days prior to the commencement of spraying and letter reports were to be submitted 14 days prior to the commencement of spraying. In Year 2 and Year 3, due dates agreed upon with Washington-PMI will be noted in each country-specific Monitoring and Evaluation Plan to assess indicator 2.2.1.

2.2.3 Number of government environmental and health officers trained in IRS environmental compliance	Total number of government environmental and health officers trained in IRS environmental compliance using AIRS Project resources	Y1, Y2, Y3	*Data source:* Project training reports *Reporting frequency:* Semi-annually	By Spray Campaign By Gender	AIRS	N.A.	N/A	N/A	N/A	N/A	
2.2.4 Number of spray personnel trained in environmental compliance and personal safety standards in IRS implementation.[10]	Total number of spray personnel who attend a training in environmental compliance and personal safety standards in IRS implementation using AIRS Project resources, includes all staff who received environmental compliance training - spray operators, team leaders, washpersons, storekeepers, etc.	Y1, Y2, Y3	*Data source:* Project records – Training reports *Reporting frequency:* Each spray season	By Spray Campaign By Gender	AIRS	3,027	5,562 M: 4,214 F: 1,348	1,205	1,107 M: 973 F: 134	986	
2.2.5 Number of health workers receiving insecticide poisoning case management training	Total number of clinical personnel trained in insecticide poisoning case management using AIRS Project resources	Y2, Y3	*Data source:* Project records – Training reports *Reporting frequency:* Each spray season	By Spray Campaign By Gender	AIRS	151	N/A	N/A	11 M:8 F: 3	TBD	
2.2.6 Number of adverse reactions to pesticide exposure documented	Total number of incidents of pesticide exposure reported that resulted in a referral for medical care	Y1, Y2, Y3	*Data source:* Incident report forms that are required for each incidence of pesticide exposure *Reporting frequency:* Each spray season	By Spray Campaign By residential/occupational exposure	AIRS	0	2 (Washers & SO) 3 cats	0	0	0	
2.2.7. Number of vehicular accidents reported	Total number of vehicular accidents reported	Y1, Y2, Y3	*Data source*: Vehicular incident report forms that are required for each accident *Reporting frequency:* Each spray season	By Spray Campaign	AIRS	0	01 Motorbike, 03 Vehicles	0	1 Vehicle	0	
2.3 Support Entomological Monitoring Activities and Insecticide Resistance Strategies											

[10] Number includes: environmental compliance assistants, sector coordinators, storekeepers, spray operators, team leaders, washers, technicians, and carriers.

2.3.1 Number of sentinel sites supported by the AIRS project	Total number of entomological sentinel sites supported by the AIRS project	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency:* Annually	By Spray Campaign	AIRS	10	10	10[11]	10	8	
2.3.2 Number and percentage of entomological monitoring sentinel sites measuring all five primary PMI entomological indicators	*[Numerator:* Number of entomological monitoring sites measuring all five primary PMI entomological indicators] *[Denominator:* Number of entomological monitoring sentinel sites] *Calculation:* [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency:* Annually	By Spray Campaign	AIRS	5 out of 10; 50%	5 out of 10; 50%	4 out of 8: 50%	5; 50%	4; 50%	
2.3.3 Number and percentage of entomological monitoring sites measuring at least one secondary PMI indicator	*[Numerator:* Number of entomological monitoring sites measuring at least one secondary PMI indicator] *[Denominator:* Number of entomological monitoring sites] *Calculation:* [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency:* Annually	By Spray Campaign	AIRS	10 out of 10; 100%	10 out of 10: 100%	10 out of 10: 100%	10; 100%	8; 100%	
2.3.4 Number and percentage of insecticide resistance testing sites that tested at least one insecticide from each of the four classes of insecticides recommended for malaria vector control	*[Numerator:* Number of insecticide resistance testing sites that tested at least one insecticide from each of the four classes of insecticides recommended for malaria vector control.] *[Denominator:* Number of insecticide resistance testing	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency:* Annually	By Spray Campaign By Type of Insecticide	AIRS	8 out of 8;100%[12]	8 out of 8: 100%[8]	8 out of 8; 100%[8]	8; 100%	8; 100%	

[11] 8 sites+2 control sites

[12] 100% to test: Pyrethroid, Carbamate, Organophosphate, Organochloring

	sites] *Calculation:* [Numerator ÷ Denominator] x 100										
2.3.5 Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS	Total number of wall bioassay studies conducted in established sentinel sites to evaluate quality of IRS spraying activities	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency:* Per spray campaign	By Spray Campaign	PMI	128 4 sites with-32 tests in each site[13]	128 4 sites with-32 tests in each site[9]	128 4 sites with-32 tests in each site[9]	5	TBD	
2.3.6 Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay	Total number of wall bioassay studies conducted at monthly intervals in established sentinel sites to evaluate the rate of insecticide decay on sprayed surfaces	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency: Per spray campaign*	By Spray Campaign	PMI	512 128 tests 4 times after spray[9]	512 128 tests 4 times after spray[9]	512 128 tests 4 times after spray[9]	Will be completed in May	TBD	
2.3.7 Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites	Total number of vector susceptibility tests conducted to gauge the effectiveness of individual insecticides proposed for use in spray operations	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency:* Per spray campaign	By Spray Campaign By Type of Insecticide	PMI	48[14]	93[15]	104	488	488	
2.4 Conduct Communications Activities and Community Mobilization											
2.4.1 Number of radio spots and talk shows aired	Total number of radio spots and talk shows aired in target spray districts to stress the safety and benefits of IRS, ensure successful spray coverage, timely vacating of premises and adherence to IRS safety precautions by community members	Y1, Y2, Y3	*Data source:* District coordinatoor reports Invoice *Reporting frequency:* Per Spray Campaign	By Spray Campaign	AIRS	140	383	160	1,033	567	

[13] For each site, 16 tests in mud supports and 16 tests in wooden supports for 32 tests total.
[14] Type of Insecticide: Deltamethrine: 8, Permethrine: 8, Lambda cyhalothrine: 8, Bendiocarb: 8, Fenithrothion: 8, DDT: 8
[15] CDC bottle: Deltamethrine: 8, Permethrine: 8, Lambda cyhalothrine: 7, Bendiocarb: 8, Pyrimiphos-Methyl: 8, DDT: 8, Alphacypermethrine: 8
WHO tube test:: Deltamethrine: 8, Permethrine: 3, Lambda cyhalothrine: 8, Bendiocarb: 8, Fenithrothion: 8, DDT: 8

2.4.2 Number of IRS print materials disseminated	Total number of IRS educational materials developed, printed and distributed to community members in target spray districts using AIRS Project resources	Y1, Y2, Y3	*Data source:* Project records *Reporting frequency:* Semi-annually	By Spray Campaign By Type of printed material and message(s)	AIRS	424,000	155,324	801,052 Leaflet: 396,101 Brochure 396,101[16] Poster: 8850	592,796 Leaflet: 294,101 Brochure: 294,101 Poster: 4,594	TBD	
2.4.3 Number of people reached with IRS messages via door-to-door mobilization	Total number of adults reached with IRS message during pre-spray community, door-to-door mobilization	Y1, Y2, Y3	*Data source:* Mobilization Data Collection Forms *Reporting frequency:* Daily per mobilization conducted	By Spray Campaign By Gender	AIRS	N.A.	1,611,432 M : 895,666 F : 715,766	1,588,180 M: 884,875 F: 703,305	996,213 M: 462,351 F: 533,862	1,620,883	
2.5 Spray Targeted Structures According to Technical Specifications											
2.5.1 Number of structures targeted for spraying[17]	Total number of structures found in targeted spray districts by spray operators	Y1, Y2, Y3	*Data source:* Daily Spray Operator Forms *Reporting frequency*: Daily per spray campaign	By Spray Campaign	PMI	410,000	380,074[18]	396,101	347,776 CHL: 83,897 South: 263,879	270,428	
2.5.2 Number of structures sprayed with IRS[19]	Total number of structures sprayed in targeted districts	Y1, Y2, Y3	*Data source:* Daily Spray Operator Forms *Reporting frequency:* Daily per spray campaign	By Spray Campaign	PMI	348,500 (85% of 410,000)	371,391	336,686	343,470 CHL: 82,091 South: 261,379	229,864	
2.5.3 Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	*[*Numerator: Total number of structures sprayed in targeted districts] *[*Denominator: Total number of structures in targeted areas found by spray operators] Calculation: [Numerator ÷	Y1, Y2, Y3	*Data source:* Daily Spray Operator Forms *Reporting frequency:* Daily per spray campaign	By Spray Campaign	PMI	85%	Total: 97.7% CHL : 96.1% SOUTH:98.2%	85%	98.76% CHL: 97.85% South: 99.05%	85%	

[16] Brochure 1,100,080 ; Pamphlets: 546265; Poster: 6800; SOP Brochure 750
[17] The yearly targets for this indicator are from the applicable workplan. The yearly results are the number of structures found by spray operators during the spray campaign.
[18] Due to insecurity, AIRS Madagascar had to remove 15,623 structures from their target number of structures.
[19] The target per year for this indicator is based on 85% of the number of structures to be targeted as noted in the applicable workplan.

	Denominator] x 100										
2.5.4 Number of people residing in structures sprayed (Number of people protected by IRS)	Total number of people residing in structures sprayed (Actual numbers are collected during spray operations; population estimates are not used.)	Y1, Y2, Y3	*Data source:* Daily Spray Operator Forms *Reporting frequency*: Daily per spray campaign	By Spray Campaign By Number of pregnant women By Number of children <5 years old	PMI	1,881,647	1,781,981[20] Pregnant Women: 60,146 Children under 5: 371,701	1,828,869	1,588,138 Pregnant women: 64,792 Children under 5: 296,395	1,676,688	
Component 3: **Provide ongoing monitoring and evaluation and quality control measures**											
3.1 Submit Monitoring and Evaluation Plan (MEP) to PMI-Madagascar	*Milestone:* (Completed/Not Completed)	Y1, Y2, Y3	*Data source:* Project records *Reporting frequency*: Semi-annual		AIRS	Completed	Completed	Completed	Completed	Completed	
3.2 Submit a post-spray data quality audit (PSDQA) report to the AIRS M&E specialist in the home office within 60-180 days of completion of spray operations	*Milestone*: (Completed/Not Completed)	Y1, Y2, Y3	*Data source*: Spray operations reports *Reporting frequency*: Per spray campaign	By Spray Campaign	AIRS	N.A. – AIRS Madagascar has been chosen to carry out the PSDQA in Year 3	N.A.	N.A.	N.A.	Completed	
3.3 Submit a country-specific Eligible Structure Definition Document to local PMI advisors and NMCP	*Milestone:* (Completed/Not Completed)	Y1	*Data source:* Project records *Reporting frequency*: Semi-annually		AIRS	Completed	Completed	N.A.	N.A.	N.A.	N.A.
3.4 Supply chain review conducted by RTT Group, Limted (RTT)	Milestone: (Completed/Not Completed)	Y1, Y2	*Data source:* RTT supply chain review reports *Reporting frequency*: Semi-annually	By Spray Campaign	AIRS	Completed	Completed	N.A.	N.A.	N.A.	

[20] Due to insecurity, AIRS Madagascar had to remove 57,171 people protected from their target number.

Component 4: Contribute to Global IRS Policy-Setting and Country-Level Policy Development of Evidence-Based IRS; Disseminate Experiences and Best Practices											
4.1 Number of guidelines/checklists/tools related to IRS operations developed or refined with project support	Total number of implementation guidelines, process checklists and program tools related to IRS operations developed or refined using the technical and/or financial resources of the AIRS Project	Y1, Y2, Y3	*Data source:* Project records – Activity reports *Reporting frequency*: Semi-annually	By Guideline/checklist/tool	AIRS	5 (2 Environmental Compliance Officer checklists, 3 M&E Tools;)	5 (2 Environmental Compliance Officer checklists, 3 M&E Tools;)	9 (6 Environmental Compliance Officer checklists, 3 M&E Tools;)	4 (3 M&E Tools, 1 Storekeeper Guide)	TBD	
4.2 Number of best practice presentations given at national/ regional/international workshops and conferences	Total number of project-related oral and poster presentations delivered in national, regional and/or international meetings related to IRS.	Y2, Y3	*Data source:* Project records – Activity reports *Reporting frequency:* Semi-annually	By IRS Technical Area	AIRS	N.A.	N.A.	1	N.A.	TBD	
4.3 Number of best practice presentations given at national/ regional/international workshops and conferences	Total number of project-related oral and poster presentations delivered in national, regional and/or international meetings related to IRS.	Y2, Y3	Data source: Project records – Activity reports Reporting frequency: Semi-annually	By IRS Technical Area	AIRS	N.A.	N.A.	1	TDB	TDB	
Component 5 (Cross-cutting): Capacity Building, Knowledge Transfer, Gender Inclusion											
5.1 Capacity Building[21] (Gender Inclusion)											
5.1.1 Number of people trained in IRS implementation	Total number of personnel trained in IRS implementation using AIRS Project resources. This figure only includes spray personnel such as spray operators, team leaders, supervisors, clinicians; it	Y1, Y2, Y3	*Data source: Project* records – Training reports *Reporting frequency*: Semi-annually	By Spray Campaign By Gender Percentage of Women	PMI	2,894	3,379 M: 3,060 W: 319 W: 9.4%	770 M:670 W:100	834 M: 786 F: 48 5.8%%	666	

[21] See Annex B for the breakdowns of the training targets as presented in the 2012 AIRS Madagascar workplan.

	excludes data clerks, IEC mobilizers, drivers, washers, porters, pump technicians, security guards, etc.			Trained							
5.1.2 Number of people trained to deliver or support IRS in target districts	Total number of people trained using AIRS Project resources to implement/support elements of IRS in target districts. This figure includes all cadre that serve a role in IRS.	Y1, Y2, Y3	*Data source:* Project records – Training reports *Reporting frequency*: Semi-annually	By Spray Campaign By Gender By Role (e.g., spray operator, storekeeper) Percentage of women trained	AIRS	14,507	14818 M: 11,235 W: 3,583 24.18%	2374 M: 1,424 W: 950	2,241 M: 1,758 F: 483 21.6%	4,224	
5.1.3 Number of personnel trained as IRS implementation trainers	Total number of personnel trained in Training of Trainers (TOT) for IRS delivery	Y1, Y2, Y3	*Data source:* Project records – Training reports *Reporting frequency*: Semi-annually	By Spray Campaign By Gender Percentage of women trained	AIRS	71	85 M:79 W: 6 7%	84 M:76 W: 8 9.5%	60 M: 59 F:1	43	
5.1.4 Number of government environmental and/or health officials trained in IRS oversight[22]	Total number of national and sub-national/district government environmental and/or health officials who are trained in oversight of IRS implementation using AIRS Project resources	Y1, Y2, Y3	*Data source:* Project records – Training reports *Reporting frequency*: Semi-annually	By Spray Campaign By Gender Percentage of Women Trained Type of government official (e.g. environmental/ health)	AIRS	N.A.	NA	N.A.	N.A.	N.A.	

[22] AIRS Madagascar does not work with the Malagasy government.

5.1.5 AIRS conducted a capacity assessment[12]	AIRS Madagascar program conducted an assessment of IRS capacity among national and sub-national/district government health officials	Y1, Y2	*Data source:* Project records – Capacity assessment reports *Reporting frequency*: Semi-annually		AIRS	N.A.	NA	Completed	Completed	TBD	
5.1.6 Number of capacity-building MOUs signed by AIRS, NMCP and partners/ institutions[12]	Total number of Memoranda of Understanding (MOU) on provision of local capacity building finalized and signed between AIRS, the National Malaria Control Program, and other local partners and institutions	Y1, Y2, Y3	*Data source:* Project records – MOUs *Reporting frequency*: Semi-annually	By Spray Campaign	AIRS	N.A.	NA	N.A.	N.A.	TBD	